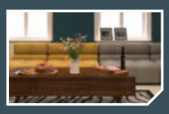

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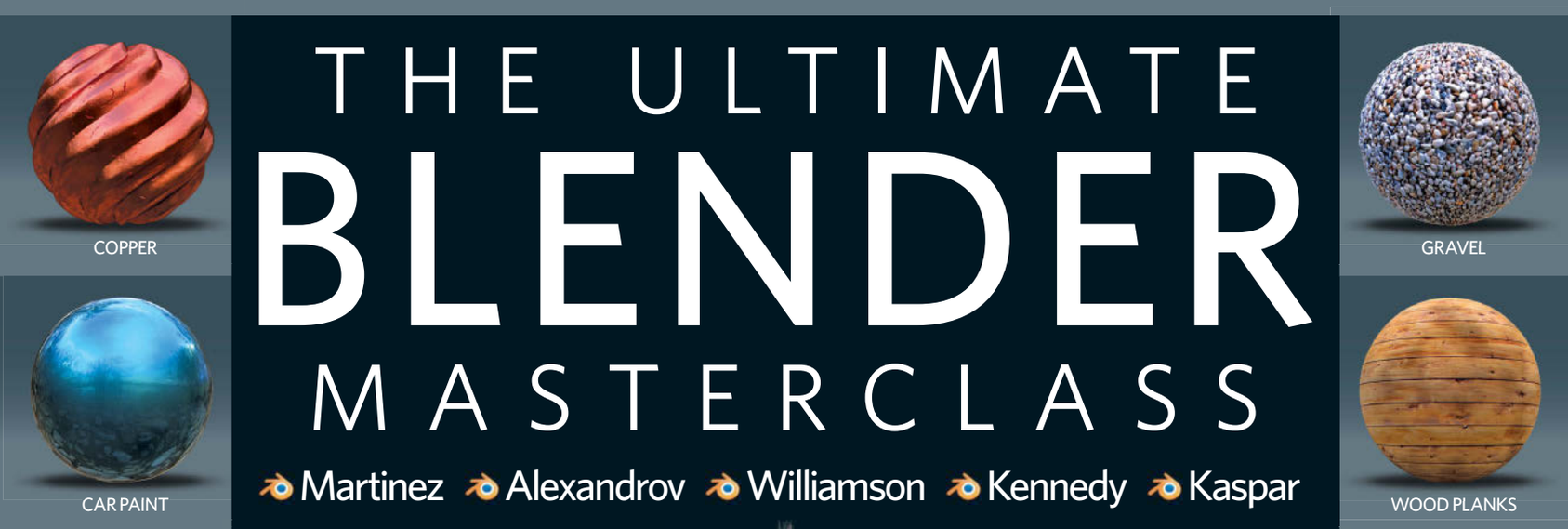
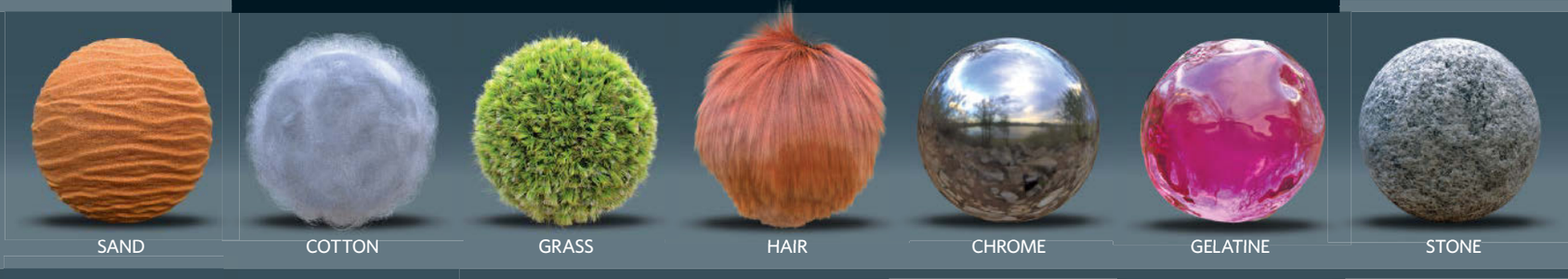
92

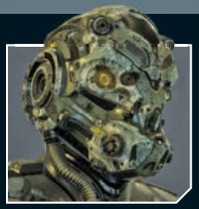
Practical inspiration for the 3D community



THE ULTIMATE BLENDER MASTERCLASS

Martinez · Alexandrov · Williamson · Kennedy · Kaspar





REAL-TIME TEXTURING

Everything you need to know about HD characters for videogames

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Give motion to a character performing an intense jumping manoeuvre

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Ultimate Blender Masterclass

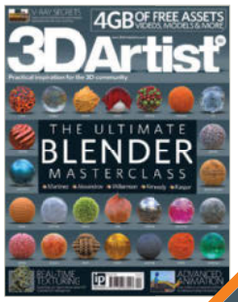
Page 28

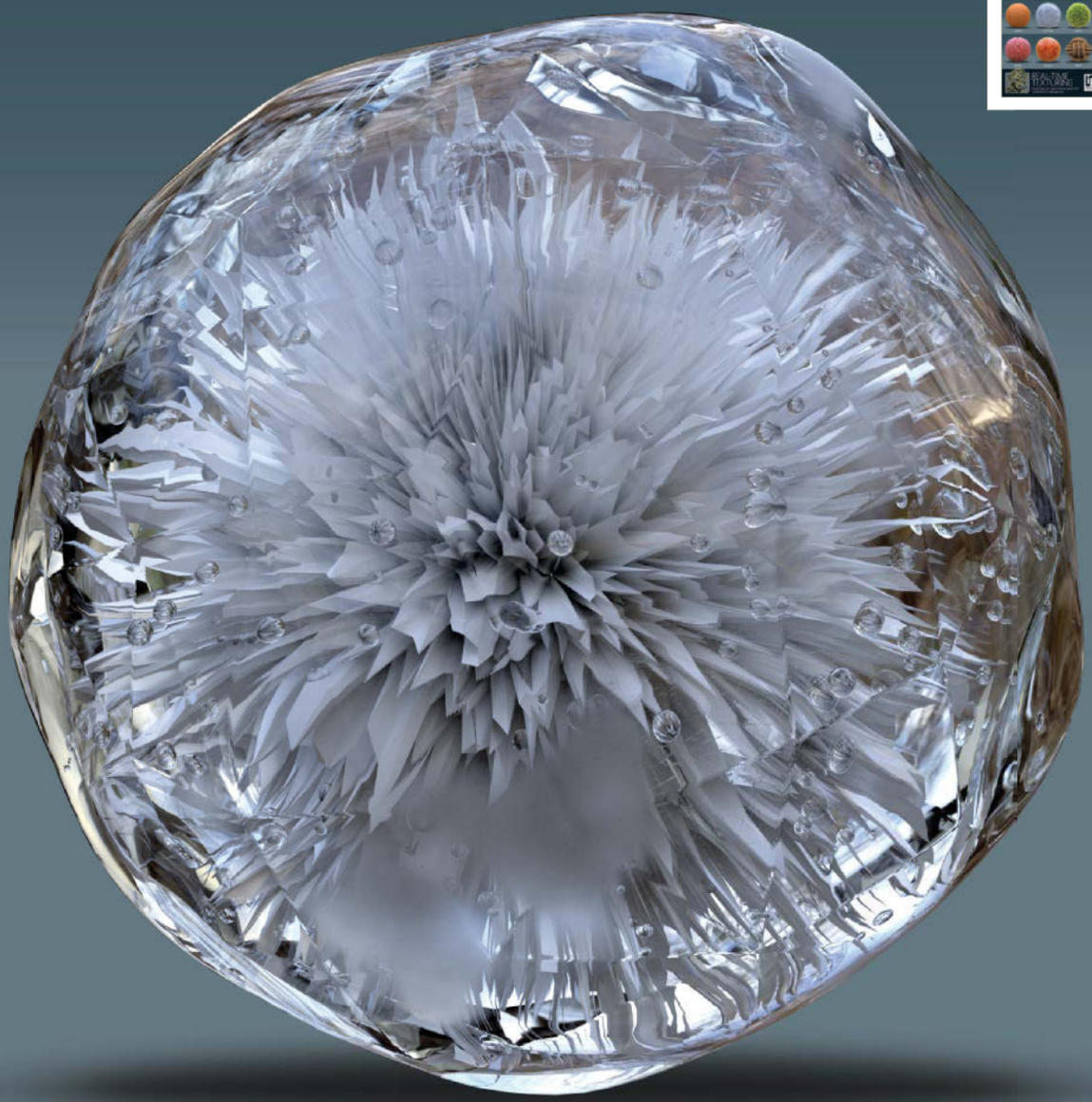
> Community relationship is one of my top priorities and it has been a very fulfilling aspect of my life as an artist

Reynante Martinez joins four other Blender masters on **Page 28**

Reynante Martinez
reynantemartinez.com

Software Blender





Non-destructive modelling in Blender **Page 38**

Welcome

We're big fans of Blender at **3D Artist**. Its power, diversity and the passion of its community is quite astounding for an app that many people palm off due to it being open source. Surely by now it's more than capable enough to stand up against the big guns? This month we've spoken to five veritable Blender masters about their approach to various aspects of the pipeline including materials, compositing and sculpting – if you're a non-believer then these guys will change your mind. If you're already on Team Blender, then this should serve as inspiration for you to take away and apply in your own work.

We're hearing of more and more studios adopting Allegorithmic's line of Substance tools in recent months – Substance's inexorable rise shows no signs of slowing, and so we've spoken to experts from Ubisoft, Treyarch and more about what makes these texturing tools so intuitive and so vital in the games industry.

On top of all of this key industry insight, later in the magazine you'll find non-destructive modelling in Blender, sci-fi environments in Terragen, real-time texturing, V-Ray lighting, abstract landscapes in 3ds Max and part one of an awesome advanced animation tutorial in Maya. There's a lot we can learn from each other, and this issue is a great place to start. Enjoy!

Steve Holmes, Editor

Sign up, share your art and chat to other artists at **www.3dartistonline.com**

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3DArtist

Imagine Publishing Ltd
Richmond House, 33 Richmond Hill
Bournemouth, Dorset BH2 6EZ
☎ +44 (0) 1202 586200
Web: www.imagine-publishing.co.uk
www.3dartistonline.com
www.greatdigitalmags.com

Magazine team

Editor Steve Holmes
stephen.holmes@imagine-publishing.co.uk
☎ 01202 586248
Editor in Chief Amy Squibb
Production Editor Carrie Mok
Senior Designer Newton Ribeiro de Oliveira
Photographer James Sheppard
Senior Art Editor Will Shum
Publishing Director Aaron Asadi
Head of Design Ross Andrews

Contributors
Gustavo Åhlén, Gleb Alexandrov, Jahirul Amin, Orestis Bastounis, Jonathan Benaïnous, Paul Champion, James Clarke, Thomas Deffet, Ian Failes, Julien Kaspar, Sean Kennedy, Reynante Martinez, Paul Hatton, Poz Watson, Jüri Unt

Advertising
Digital or printed media packs are available on request.
Head of Sales Hang Deretz ☎ 01202 586442
hang.deretz@imagine-publishing.co.uk
Account Manager Simon Hall ☎ 01202 586415
simon.hall@imagine-publishing.co.uk

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Head of Circulation Darren Pearce ☎ 01202 586200

Production
Production Director Jane Hawkins ☎ 01202 586200

Finance
Finance Director Marco Peroni

Founder
Group Managing Director Damian Butt

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The Expert Panel

This issue's team of pro artists...

JÜRI UNT
cgstrive.com

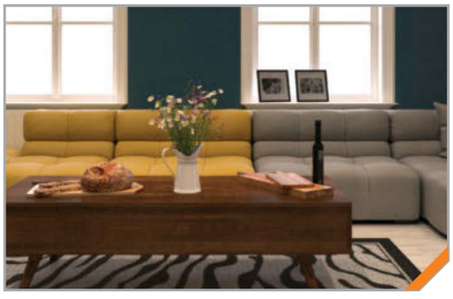
We found Jüri whilst trawling through the fantastic galleries on **blenderartists.org** and wanted to learn more about his Blender AstroMonkey workflow. Re-create it for yourself on p38.
3DArtist username cgstrive

GUSTAVO ÅHLÉN
facebook.com/gustavoahlenstudio

This month, Gustavo takes on building a convincing sci-fi environment using Terragen 3. Learn how to use nodes, work with fractal terrains and create atmosphere over on p46.
3DArtist username gustavoahlen

JONATHAN BENAÏNOUS
jonathan-benainous.blogspot.com

If you're a regular reader you might recognise this image. Back in issue 84, Jonathan taught you how to model his sci-fi helmet in ZBrush. Now, he's here to teach you how to texture it in real time.
3DArtist username Jonathan Benaïnous



PAUL HATTON
cadesignservices.co.uk

V-Ray is an extremely popular tool, but how much time have you spent actually experimenting with different settings? On p60, Paul has taken an in-depth look at the lights on offer in the renderer.
3DArtist username Phatton

THOMAS DEFFET
thomasdeffet.com

In a really interesting tutorial – his first for the magazine – Thomas reveals how to use 3ds Max and Forest Pack to create awesome abstract environments. You'll find him over on p64.
3DArtist username Tukifri

JAHIRUL AMIN
jahirulamin.com

It's been a while since Jahirul has written for us, so we're glad to welcome him back. This time out he's broken down a parkour sequence to show you how to animate one for yourself. Not to be missed.
3DArtist username n/a

PAUL CHAMPION
linkedin.com/in/pchampion

Pulldownit is a robust destruction plugin for Maya for tearing down walls, shattering glass and any other vandalism you can think of. Paul takes version 3.7 for a test drive on p74.
3DArtist username Rocker

POZ WATSON
uk.linkedin.com/pub/poz-watson/61/4a3/506

We got Poz to reveal the magic of Blender by speaking to five masters of the software. Get inspired by these top artists and learn core workflows for the open-source tool on p32.
3DArtist username n/a

ORESTIS BASTOUNIS
twitter.com/MrBastounis

We're seeing loads of mobile workstation products hitting the market at the moment, which is perfect for students and freelancers. Check out Orestis's verdict on the Lenovo P70 on p76.
3DArtist username n/a

3D rendering?
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Contents

What's in the magazine and where

News, reviews & features

10 The Gallery
A hand-picked collection of incredible artwork to inspire you

22 The Rise of Substance
We speak to Treyarch, Ubisoft and Camouflaj about how Allegorithmic's tools are taking over the world

27 Technique Focus: Feet
Jessie Martel explains how important it is to use good reference material

28 The Blender Masters
We've assembled an astonishing group of experts to bring you the lowdown on the best tools and techniques in the open-source software

72 Subscribe Today!
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74 Review: Pulldownit 3.7
Paul Champion puts the destruction plugin through its paces

76 Review: Lenovo P70
Orestis Bastounis takes this ridiculously powerful mobile workstation for a spin

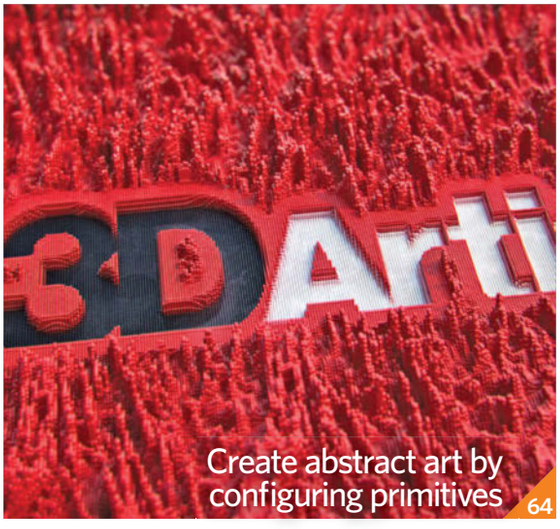
84 Technique Focus: Peugeot 205
Arthur Gatineau reveals his expert approach to texturing

90 Technique Focus: More Than Meets the Eye
Yuki Sugiyama explains how this incredible composition came together

"We found that traditional software was limiting us in our ability to go full PBR"

Lucas Granito from Ubisoft explains the appeal of Substance **Page 24**

22

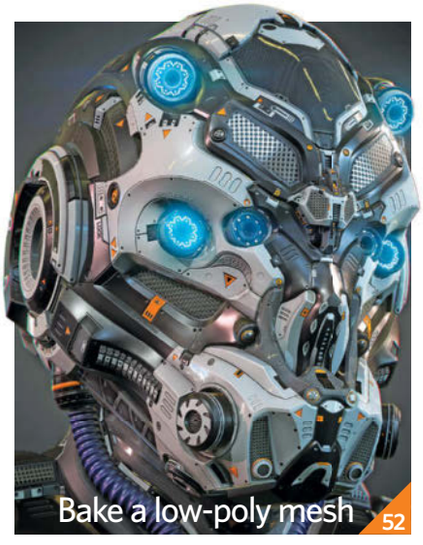


Create abstract art by configuring primitives

64

ILM London

86



Bake a low-poly mesh

52

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"My advice to artists using other 3D apps... just dive in to Blender and see for yourself"

Reynante Martinez urges devotees of other tools to diversify **Page 30**

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The Pipeline

38 Step by step: Non-destructive modelling in Blender
Jüri Unt reveals his interesting Blender to Houdini workflow

46 Step by step: Use shader nodes to create sci-fi terrain
Get to grips with Terragen 3 with the help of Gustavo Åhlén

52 Step by step: Bake a low-poly mesh using UV sets
Upgrade your videogame textures with Jonathan Benaïnous and Substance Designer

60 Pipeline techniques: Master V-Ray lighting
Paul Hatton gives you a rundown of the key lighting setups for V-Ray

64 Pipeline techniques: Create abstract art by configuring primitives
Thomas Deffet shows off some interesting effects in 3ds Max

68 Pipeline techniques: Animate a parkour sequence – part 1
Jahirul Amin lends his expertise to an incredible animation. Check back next month for part two!

The Hub

80 Community news
Find out how the winning entries in the 2016 Creativepool Awards were put together

82 Industry news
Amazon launches Lumberyard, its new game engine, plus MODO gets some shiny new lighting tools

86 Industry Insider: David Vickery
We sit down with ILM London's acting creative director to talk past, present and future

92 Readers' gallery
The very best images of the month from www.3dartistonline.com

The Gallery

Have an image you feel passionate about? Get your artwork featured in these pages
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Sérgio Merêces
sergiomereces.com

Sergio works on national and international projects. He focuses his skills on arch-vis

Software 3ds Max, V-Ray, After Effects

Work in progress...

"This was a 3D render project for a place in the woods where we can be in nature and with animals in a totally peaceful, almost secret place with our family. My main inspiration is nature itself for these renders"

Sérgio Merêces, *Valkyrian,* 2015

“I always wanted to do a themed project that would eventually turn into a book of some kind, and this is one of the images from that project. I’m heavily influenced by heavy metal cover art type work, so naturally my personal art reflects that. To assist in the creation of these images, I’m pulling from my own set of kitbash libraries”

Mark Van Haitsma,
Pestilence, 2016

Mark Van Haitsma
bit.ly/1QnU7Ey

Mark is a senior artist with over 12 years of experience in the videogames industry

Software 3ds Max, ZBrush and Photoshop

Work in progress...

“This image was a speed project where I challenged myself to create a project from scratch in a week. It was really fun, since I learned some new techniques”

Guzz Soares,
Flamenco Dancer, 2016

Guzz Soares
behance.com/guzz

3DArtistOnline username:
Guzz Soares

Software ZBrush, Marvelous Designer, 3ds Max, V-Ray

Work in progress...

Reza Abedi
bit.ly/1QnUkYp

Reza lives in Brazil and has over seven years of experience as a 3D modeller/texture artist

Software ZBrush, MARI, Maya, Quixel DDo, V-Ray

Work in progress...

"I created this image to remind everyone that laughing is the first thing that we must keep in mind. Honestly there is always something in life, but how great would it be if we could just forget it all with a simple laugh. I know sometimes it's really tough but it's not impossible."

Reza Abedi,
Smile At All Ages, 2016

“This image is a part of my personal project ‘Veggie Apocalypse’. It started as an exercise in a concept art class and became my personal creative outlet between commercial projects”

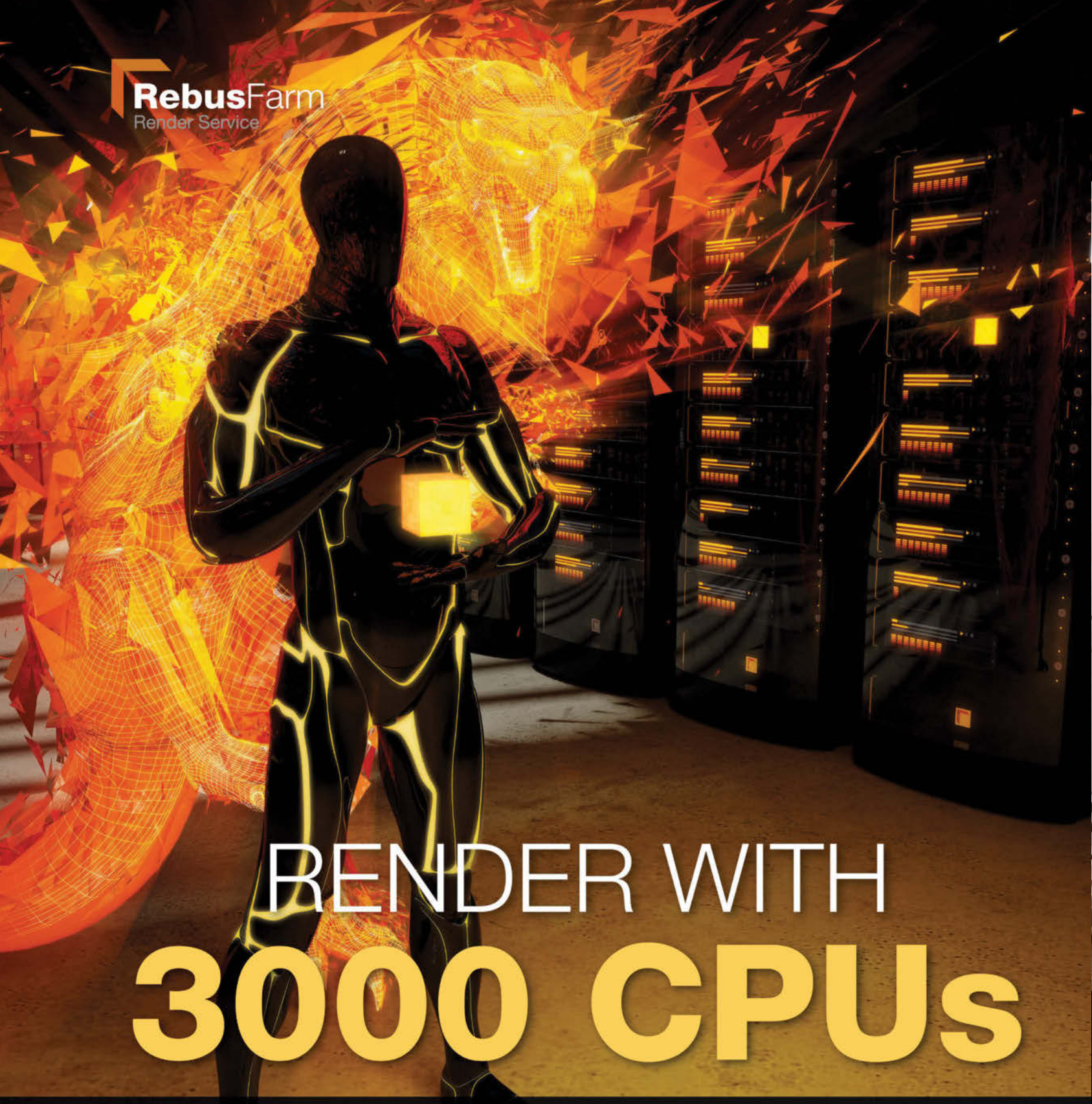
Daniel Dulitzky,
Monster Strawberry, 2016

Daniel Dulitzky
danieldulitzky.com

Daniel has years of experience in many digital artist roles, including storyboard artist

Software Mudbox, 3ds Max, Corona Renderer, Photoshop

Work in progress...



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3D ARTIST

My name is Cauê Rodrigues and I'm a 34 years old CGI Artist from Brazil specialized in architectural visualisation. This project is called "Duo Project" and was born after me and my wife–we are also business partners– saw a very nice image on the internet which inspired us. It had good lighting and nice mood, so we decided to reproduce it but with some alterations and adding our own details. We imagined what the scene would look like, experimenting with camera positions, changing furniture and materials like the floor, woods and so on. The scene was created using Corona Renderer which we really like a lot as it keeps our workflow simple and helps us to focus. In the end we selected 7 camera angles and rendered the final images at Rebusfarm.net. Their render time is very good and the pricing is favourable. Thank you so much guys!

Portfolio: **http://cauerodrigues.net/**

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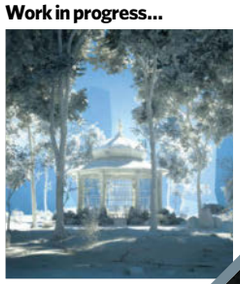
Tamas Medve
m3dve.cgsociety.org

3DArtistOnline username:
m3dve

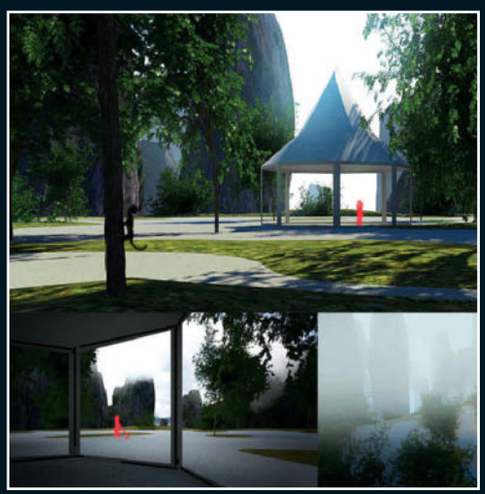
Software 3ds Max, SpeedTree, Photoshop

Work in progress...



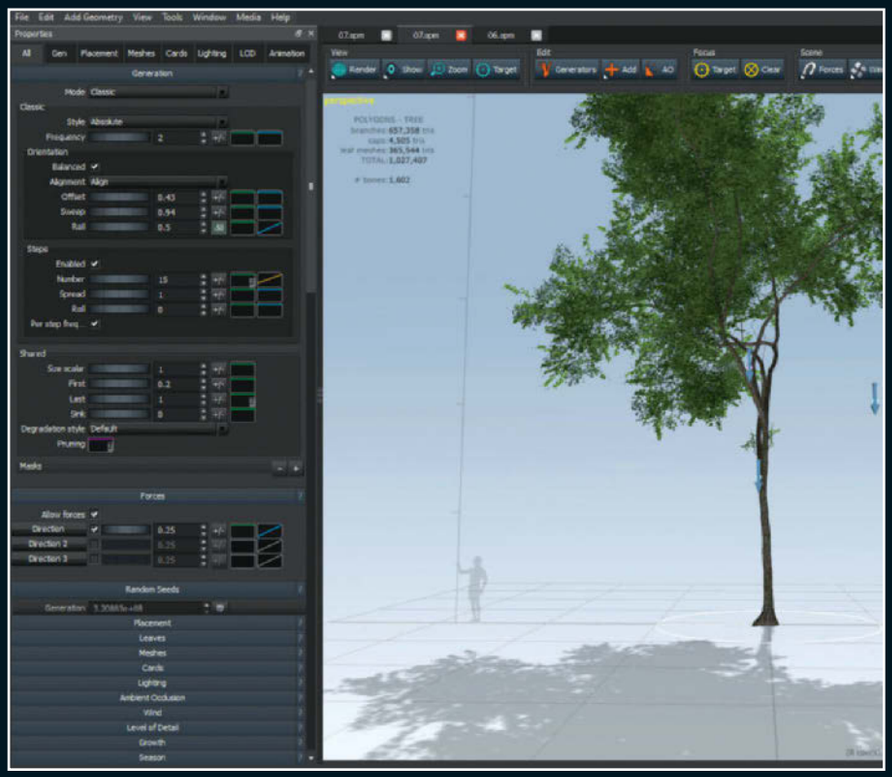
“A few months ago I was working on a zen garden for an architect studio, and after that I felt I had to make my own mysterious garden”
Tamas Medvé, *Valley of the Monkeys,* 2015

> Post-production is a bit like cooking and the render element passes are a bit like the spices. How you use the render elements depends on taste. They are extremely useful and give you a lot of freedom in lighting, atmosphere, focus... basically everything
>
> **Tamas Medve,** *Valley of the Monkeys,* 2015



SKETCHING
ABOVE This is the stage where I make a preliminary scene for the project. I try out the things that I imagined initially and it's also a good time to do some experimenting! There's always a chance for us to find other approaches and play around with lights without discarding too much. Try to make the sketch as good as you can, but make sure to use basic models for this and don't spend too much time on the details.

MODELLING THE PAGODA
ABOVE You don't need advanced modelling skills to build up a scene like mine. I didn't use any special tricks, only basic poly modelling. For the pagoda I only modelled one small piece that I rotated seven more times around the centre point. I did the same with the metallic roof of the building.



CUSTOM-MADE TREES
ABOVE For this project I wanted to use trees that are unique and that no one has used before, so I decided to make my own trees. To create them I used SpeedTree, which is a really powerful software that is specialised for trees! You can make any kind of tree you want and even animate them if you want to achieve a wind effect.

SET UP THE CAMERAS
ABOVE Once I set up the base scene, it's time to start placing the cameras. I was planning to do three images so I made three different scenes with three different kinds of lighting for each angle. I had already done plenty of tests to know where I wanted to put the cameras. Of course I tweaked these angles later on by changing the focal length, target position and aspect ratio. Note: If you want to emphasise something, try to put it in the middle or a third (as in the Rule of Thirds). These are basic rules that most people will know, but they work so well.

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THE RISE OF SUBST

Allegorithmic's highly adopted 3D texture software seems to have sprung from absolutely nowhere, but the history of the impressive and user-friendly Substance applications rests in hardcore science

Have you fought the campaign in *Call of Duty: Black Ops III*? Perhaps you've taken aim inside *Rainbow Six Siege?* Or maybe you've become immersed in the universe of *République*? If so, then you've already witnessed the power of the 3D texture-painting software made by software developer Allegorithmic.

Those games are just some of the countless titles from developers, such as Ubisoft, Treyarch and Camouflaj, that have adopted Allegorithmic's Substance tools for 3D material generation and texture painting.

In fact, as the videogames industry continues to push the art in real-time photorealistic characters and environments, nearly all triple-A game makers rely on making use of Substance. But just how did this suite of tools, which is largely made up of node-based texture creator Substance Designer and the parametric 3D texture-painting software Substance Painter, become the global industry standard?

That story begins at the turn of the millennium, when Allegorithmic's founder and CEO Sébastien Deguy was a University of Auvergne computer science PhD candidate. At the time, he was using wavelets and fractal techniques to synthesise natural phenomena like clouds. The result looked great – or so he thought. Deguy's thesis supervisor pointed out that something wasn't quite right – the clouds looked like clouds, but not like real clouds.

That distinction would be critical. Deguy soon figured out that what was missing was a realistic simulation of elements, including wind and gravity in an iterative and 'structurally modifying' process. "I realised that the noise functions that were so important in the creation of rich CGI were not that developed in the most advanced digital content creation tool of the time."

In 2001, Deguy founded Allegorithmic and the company soon developed products, such as Substance Designer, based on the noise function research he had been exploring to enable the

République by Camouflaj

ANCE

creation of 3D textures. Built around a node graph with non-destructive capabilities, that product immediately appealed to many artists who were looking for an alternative solution to Photoshop for materials generation.

But Deguy was not done there – Allegorithmic didn't yet have a 3D painting tool. Deguy kept thinking about the clouds dilemma and so, in 2004, he had a trainee write a prototype that "simulated fractures, erosion, dust accumulation, stains and waterdrop movement using a versatile, dedicated particle system."

That prototype was fleshed out a further few years later when Allegorithmic partnered with PopcornFX on a new iteration of the particle system, after Deguy saw what PopcornFX had itself been developing in the area. "I asked them," he recalls, "can your particles stick to a surface if I throw them at it?" That inspired the two companies to collaborate on the particle-based painting feature Deguy had always envisioned.

There was still one more critical step in the process to making what would ultimately become Substance Painter. "One of the talented devs in my team came up with a prototype in his spare time," explains Deguy. "It was a fully GPU-based, multi-channel painting app that was really working well and was super-fast. There was some kind of a planet alignment because such 3D painting functionality was the main, big feature that was missing in the Substance toolset at the time."

It had been more than a decade since Deguy's original research, but when Substance Painter was launched in 2014, Allegorithmic now had an impressive suite of texture painting tools. Despite the lengthy time in development the gaming industry rapidly embraced Substance, for several reasons. Among them were the friendly UI, the highly appealing non-destructive pipeline, that the custom material presets can be shared studio wide for high consistency, and what Deguy suggests are "artist-empowering" tools.

One of the *Rainbow Six Siege* character models in Substance Painter, by Ubisoft character artist Jason Mark

"The tools come with a bunch of new techniques that augment the hands of the artist," he says, "so it is a great feeling to direct the work, rather than having to take care of every little detail and losing the big picture. You can of course paint every pixel by hand if you want because the tools are hybrid. But you can benefit from the tools at your disposal to go faster and concentrate more on your art than on technical details."

If there is one aspect of the Substance applications that has appealed to videogame developers the most, it is perhaps their ability to handle physically-based rendering (PBR) as a default, and handle it fast.

That's exactly what Ubisoft took advantage of in Substance Painter and Designer for first-person shooter, *Rainbow Six Siege*. "Our project demanded realism because it took place in contemporary environments, so we couldn't stylise the game," says Ubisoft senior technical artist Lucas Granito. "We really wanted to create that immersion by getting realistic results."

"We found that traditional software was limiting us in our ability to go full PBR, which means that it was very difficult to get a consistent result between different artists," adds Granito. "Substance allowed us to create the most advanced PBR project to date in Ubisoft's history."

Game developer Treyarch saw benefits in the Substance approach to PBR too, with *Call Of Duty: Black Ops III*. "Being able to create our work in a PBR viewport allowed us to work more quickly and more efficiently," notes Treyarch senior artist Pete Zoppi. "There was far less guess work involved when authoring our textures because we could clearly see how each texture channel was working on our models. It was efficient and fun to be able to view this information real-time and make artistic decisions on the fly."

"The Reaper in *Black Ops III* is a great example of where Substance Designer saved us an immense amount of time," says Zoppi. "The Reaper had close to 30 materials, many of which needed similar texture and material treatment. We were able to make one graph in Substance Designer for his metallic armour and once we nailed down the look, we were able to propagate that graph to all of the other metallic parts seamlessly and quickly."

"It allowed us," continues Zoppi, "to spend the time upfront on one part of the body and finesse that texture until we were completely happy with it. With that one part approved we applied the same graph to all of the other similar pieces, and we ended up with an [almost] fully textured character in a fraction of the time it would have previously taken."

Another studio that has wholeheartedly adopted Substance is Camouflaj, the maker of episodic stealth game *République*. Originally developed for iOS and Android devices, *République* was expanded to PC, OS X and PlayStation 4 in 2016. But those expansions required much higher quality shaders than had been realised for the mobile versions of the game to be produced – they needed to be done quickly inside Unity 5, and this is where Substance came in.

"In less than four months, one of which was the team learning the software and best practices," outlines Camouflaj art director Stephen Hauer, "we were able to process and update over 2,000 unique materials resulting in over 10K worth of unique texture data. Substance provided us the quality and fidelity to be able to hit our aggressive deadlines with time to spare. On top of that, having the ability to create hundreds, if not thousands, of material variations from a single substance file saved hundreds of [working] hours. That's performance and authoring speed you cannot ignore as a game developer."

A fast adoption rate in the videogames industry can lead to a nightmare when it comes to training and support, however this isn't true in this instance. Substance's meteoric rise amongst game developers has, according to many Allegorithmic users, been accompanied by strong

PRO TIP

"To create a painted metal surface, start with a metal material as your base and add a paint material on top, then use the layer mask to remove paint in key areas"

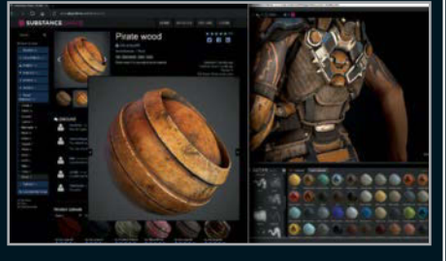
Lucas Granito, senior technical artist, Ubisoft

Substance Designer enabled Treyarch senior artist Pete Zoppi to be more efficient with his time

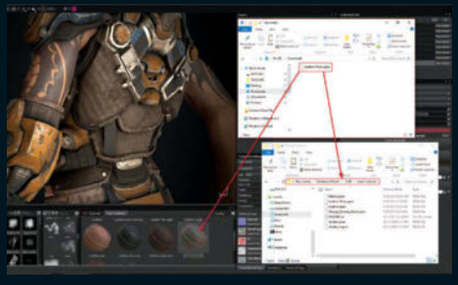
TEXTURE WITH SMART MATERIALS

Allegorithmic community manager Wes McDermott reveals how to get flexible materials with Smart Materials

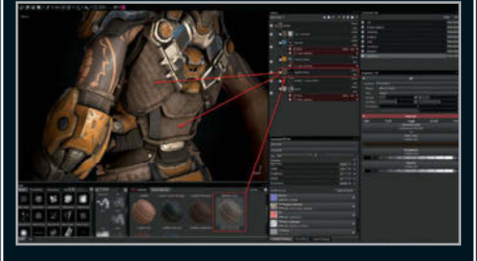
A Smart Material is a preset of layers constructed from the layer stack in Substance Painter. The layers within a Smart Material are fully editable. Any baked maps that are used in a Smart Material will automatically be updated when the material is applied to a different texture set. This makes Smart Materials very flexible and versatile for use across texture sets and projects.



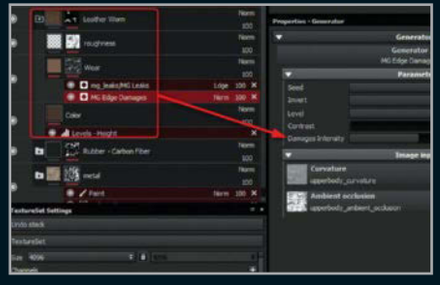
01 Get Smart Materials Substance Painter ships with several Smart Materials in the Shelf under the Smart Materials tab. You can also download free Smart Materials from Substance Share (**share.allegorithmic.com**) for use in your projects.



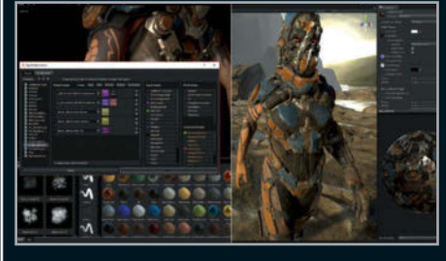
02 Add the material to enable access To gain access to the Smart Materials across all of your projects, you can add the SPSM file to the user shelf directory. All that's left then is to physically add them into the project, which we will go over in the following step.



03 Use the chosen Smart Materials Now you can start using Smart Materials; all you have to do is simply go over to the Shelf>Smart Materials tab, and then drag and drop the chosen materials into the layer stack for the currently active texture set.



04 Customise the material The layers and content that comprise the material are fully editable. You can easily make changes to any of the parameters, and that includes changing colours, using blending modes or adjusting the values set by the mask generator.



05 Export for engine You can export textures using presets for popular renderers and game engines such as Arnold, V-Ray, Unreal Engine 4 and Unity 5. You can also convert maps and configure custom exports to pack maps for specific implementations.

With offices spanning three continents, Allegorithmic's team is constantly growing

support from the company itself. "When we started using Substance Painter," comments Ubisoft's Granito, "it was an early version, but Allegorithmic was such a great partner and helped us along the way. We were able to fully integrate it into our pipeline in time for full production."

Zoppi had a similar experience: "On many occasions, Allegorithmic visited our studio to inform us of new tools and developments with the software. We have open lines of communication with them for feature requests, as well as bug reporting and overall feedback to help make the software better. Even in the short amount of time that their software has been available we've seen immense progress in feature set and overall quality."

With such an accelerated uptake from games studios, is there anything left for Allegorithmic to conquer? Definitely, answers Sébastien Deguy, who says the company is pushing development in the areas of industrial design, arch-vis, VR and feature films. "Film studios have been so vocal about their interest in seeing Substance Painter integrate a few features to make it perfectly suited to their needs, [and] we are currently implementing them."

While Deguy is somewhat coy about what we might expect in future Substance releases, he admits that "what still needs to be cracked is mostly on the [user experience] side, and we have things in the works."

The CEO also says upcoming iterations of Substance Painter will look to make all actions editable, even more than the already comprehensive non-destructive aspects of the software. Another item on Deguy's wishlist is the desire to remove the need for UVs – "if not completely, at least making the process less painful," he says.

Allegorithmic is certainly ramping up with big plans in mind. There are already nearly 60 employees spread between three French locations, the US, Japan, South Korea and China. And in an ever-changing industry, Allegorithmic has adapted its products to suit – last year it introduced Substance Live, a rent-to-own licensing system for its main suite of products.

The company is constantly hiring new members to join the team and is also looking to broaden the scope of Substance in the digital content industry. There's now even an Allegorithmic Research division which, says Deguy, is all about "having a bunch of crazy scientists work on crazy stuff, 90 per cent of which will never be in any of our products, but 10 per cent of which might change our little world."

Given Allegorithmic's progress so far, that certainly looks possible.

PRO TIP

"The validation materials in Substance for verifying if content is authored physically correct is a time saver, especially when on-boarding new talent"

Stephen Hauer, art director, Camouflaj

FIVE WAYS SUBSTANCE APPS CAN IMPROVE YOUR WORKFLOW

There's so much, well, substance to Substance. Find out how these must-know features can help you make the most of texture painting

01 **Have no fear** Every action and stroke in Substance Designer and Painter is non-destructive, so you can try things out and not lose any work.

02 **Stay focused** Built-in texture bakers let you remain in one program without having to move images or other data back and forth between a variety of applications.

03 **See results fast** Preview your asset in a PBR (physically-based rendering) viewport with all textures applied to fine-tune Albedo, Normal, Specular and Gloss maps.

04 **Less sculpting, more painting** Take advantage of height maps in Substance Designer to reduce the need for ZBrush sculpts.

05 **Try something new** Go beyond the usual painting tools by using a Substance Painter particle brush to mimic the effects of natural elements like wind and rain.

Technique focus

Incredible 3D artists take us behind their artwork

REFERENCING I was looking for a new, very simple model, but with a lot of emotion. I found a reference for these feet, and this was a very interesting challenge for me to reproduce a realistic model, with a story that you can feel when you look at it. My starting point is very often a good reference, as it gives you detailed lighting, colours, and shaders.

Jessie Martel
jessiemartel.com

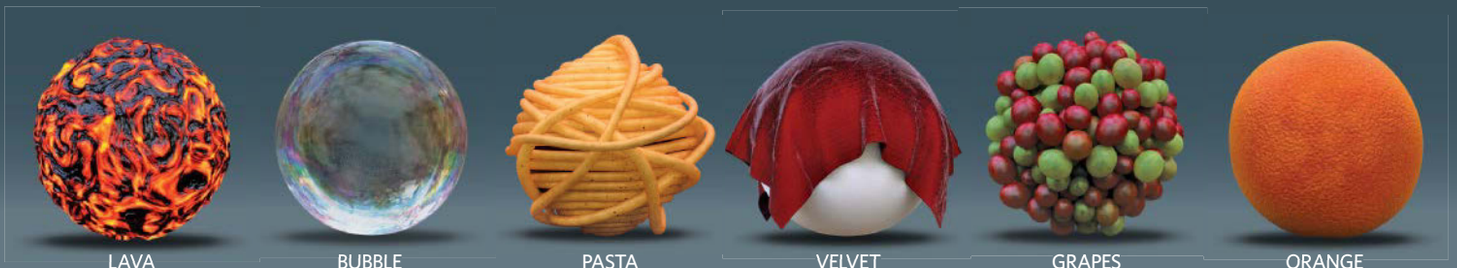
Jessie is a texture artist at Digital Dimension and has also worked on triple-A projects at Ubisoft

Software MARI, ZBrush, Photoshop, 3ds Max, V-Ray

Feet, 2016

ULTIMATE BLENDER MASTERCLASS

THE BLENDER



MASTERS

It may be free, but Blender is a diverse and powerful tool thanks to the freedom it offers. Five of its best-known users reveal how to exploit its open-source magic

Blender is changing lives all across the globe says Gleb Alexandrov. "It's not even hyperbole," he tells us. "Blender gives aspiring artists the tools to realise their vision, to make a living and to get into the computer graphics industry. That's a game changer."

Jonathan Williamson agrees, highlighting the two main benefits that Blender offers: "The first applies primarily to individuals and small teams, and that is that Blender is a complete production suite. Blender can handle the entire production process of an animation from start to finish, including modelling, rigging, animation, lighting, layout, rendering and even compositing. The second advantage is the ability to fix, customise or alter Blender. [By being] open source and having an extensive Python API there's really no practical limit to what you can do with Blender. Need a new tool? Build it. Find a bad bug? No problem: fix it or submit a bug report to the core team and/or community."

Blender has also created what Alexandrov calls "a smart crowd. Modellers, motion graphic artists, scientists, film-makers and architects make Blender what it is... [It's] building the future and its recognition by brands like Pixar is the proof."

REYNANTE MARTINEZ

reynantemartinez.com

MATERIALS

3D Artist: How and when did you first start using Blender?
Martinez: It was by serendipity that I encountered Blender around 12 years ago through my older brother. We are advocates of open-source software and having used GIMP, we came upon several 3D artworks that inspired me a lot. What struck me most was these magnificent art pieces were created using a free software. If I remember it right, it was Blender version 2.33 that we downloaded. Shortly after executing the application, I was stunned by the sheer amount of buttons and menus, which made me close the application. But for some reason I kept coming back at it and to this day, I never regretted having chosen it as my primary creative tool.

3D Artist: What are the biggest challenges you face, and how do you tackle them?
Martinez: In a nutshell, it's the overall time you spend on creating materials and PBR textures from scratch, since Blender doesn't have a built-in library of material presets to work from. And this is also the very reason I have created my personal library of materials, which appealed to many users, leading me to create the Cycles Material Vault (**cyclesmaterialvault.com**). The first volume basically contains over 100 materials that can be customised at will to create varieties and new materials altogether.

3D Artist: What are the most difficult materials to create?
Martinez: In my personal experience, it has been materials which involve Subsurface Scattering – tomato, grapes, oranges, wax, milk and so on. At the moment, SSS support in Cycles is only via using the Experimental feature set, which can be slow at times, plus most of the SSS settings require you to fiddle around with the settings until you get the right look and feel.

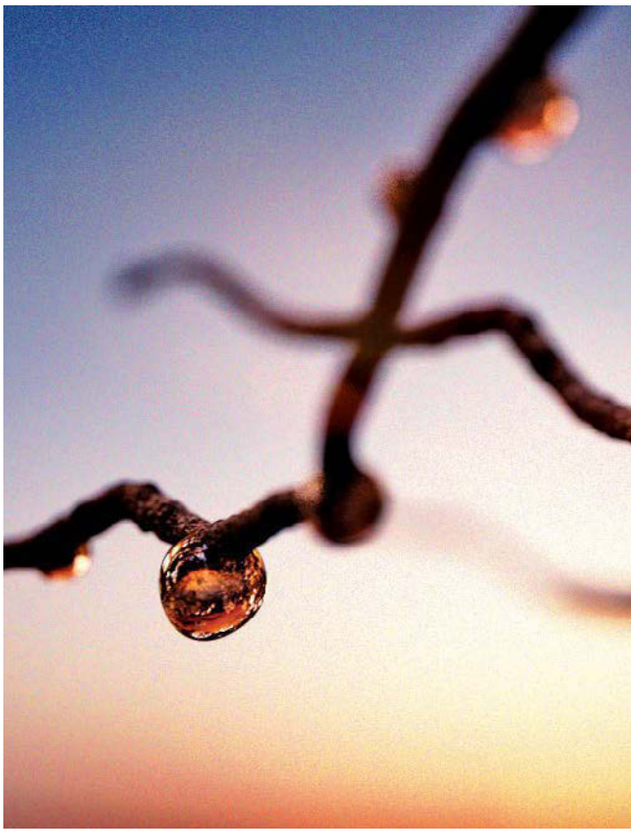
PRO TIP

Study real life textures and materials – you'll be surprised at how much you can learn. And while there's still a lot that Blender's material system lacks, this doesn't mean they can't be worked around to achieve the desired effect.

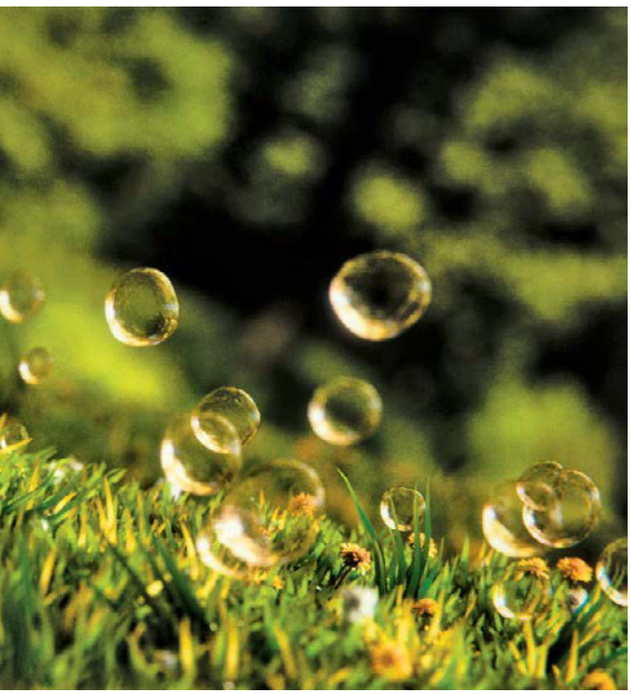
3D Artist: What do you get out of being involved in the Blender community?
Martinez: With my involvement at Blender Guru, community relationship is one of my top-most priorities and it has been a very fulfilling aspect of my life as an artist. In addition to this, I constantly provide feedback and support to Blender users who want to develop their skills further and to get answers to questions.

My advice to artists using other 3D apps like 3ds Max or Maya: just dive in to Blender and see the difference for yourself. There's no harm in trying and you won't be spending a dollar either.

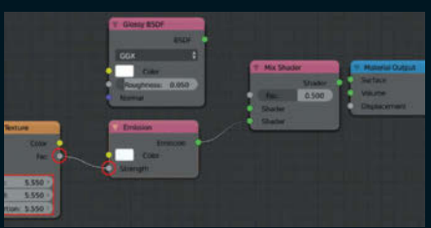
Do remember, though, that the tool that you choose to use is just that – a tool – it will eventually boil down to your basic understanding of colour, composition, lighting and the other facets of art.



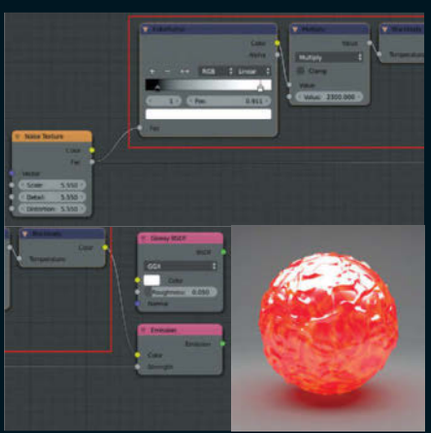
CREATE A LAVA MATERIAL USING SHADERS WITH REYNANTE MARTINEZ



01 Set up the scene As with most materials, it starts with a basic setup. In this example, it's a combination of a Glossy shader and an Emission shader. In the following steps, we'll use several nodes to control which parts of the object are affected by these two shaders, and the colour they produce.

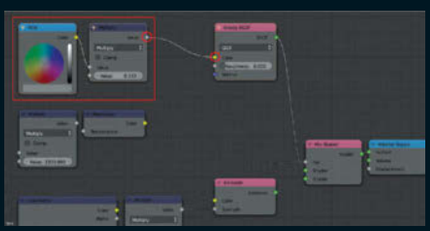


02 Work on the noise Now we will work on creating the noise texture. To create the initial texture that will later define the patterns, add a Noise texture and adjust the values accordingly. Use the Factor output of the Noise texture as the Strength input of the Emission shader.

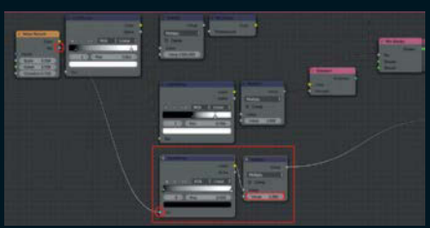


03 Get colour variation from nodes This is one of the most crucial parts of creating this lava material. To define the 'hot' areas of the material, add a Blackbody node which will add colour variations depending on its input. We will then use the Factor output of the Noise texture we used in Step 2 as its temperature input. Adding a ColorRamp node and a Multiply node in-between will determine the colours that will appear.

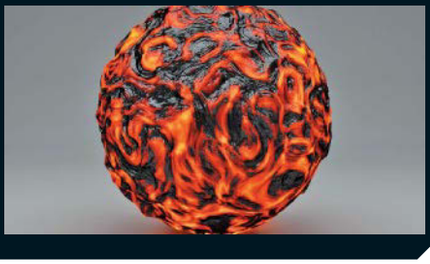
04 Make a glow mask An Emission glow mask is the next step. Add another set of ColorRamp and Multiply nodes like like the ones in Step 3 and use these nodes to modulate the Strength of the Emission shader and as a Factor input for the Mix shader (between Glossy and Emission).



05 Change the reflection Currently, the reflection amount of the material is way too much and is distracting us from seeing the true shading of our object. To alleviate this issue, we'll control the overall brightness of the Glossy shader's colour, which in turn will control the overall glossiness.



06 Work with noise texture Finally, to add depth and that extra bit of realism to our material, we'll use the Noise texture created in Step 2, attach it to a ColorRamp node and a Multiply node, then connect it to the Displacement input socket of the Material Output node. To control how much displacement the material has, change the Value of the Multiply node. Voila! You now have a basic and easy-to-use lava material.



JONATHAN WILLIAMSON

cgcookie.com

RETOPOLOGY

3D Artist: What advice would you give people to achieve good topology?

Williamson: For most people I see, it's a lack of solid understanding of what makes for good topology, and why that topology makes a difference. Having good tools at hand doesn't do you any good if you're unsure of how to use them effectively.

In this case, there's nothing that Blender, or most other software, can do to really help. Sure, automatic retopology is constantly improving, but for those situations that require high-quality mesh flow, such as an organic deforming character, then these solutions only get you so far. With that in mind, my technique is to put the goal and outcome above the process and to understand the requirements of the subject. No matter if you're using an automatic retopology tool, manually placing each vertex or using something else, it's the final mesh that matters – not how you got there.

PRO TIP

Take the time to understand the requirements of the surface that you're retopologising before you even create a single vertex... it's important that you know what they are so that you can make an informed decision and create a mesh that will do what it must.

3D Artist: How have your retopology techniques changed over time?

Williamson: My techniques for retopology have changed drastically! This in no small part due to my efforts in creating RetopoFlow. Stepping back for a moment, Blender has had okay retopology tools for quite some time; they were never great but never awful either. Even though I count myself among the few artists that legitimately enjoy the retopology process, the tools Blender had tested my patience a lot. The main problem with these tools, and the tools in most software, is that they still required a lot of manual work to create the actual geometry, regardless of topology flow. I found this to be a problem because retopology is not about modelling forms, but rather retopology is about defining the mesh flow of an already existing form.

I found that too much of my time was spent creating an initial mesh and then adapting it to the original surface. I felt that we needed tools that enabled you to work directly on the surface, focusing 100 per cent of your attention on the final mesh flow. My techniques have changed dramatically as I'm now using a whole new set of tools that previously didn't exist in Blender.

3D Artist: What kind of retopology weaknesses does Blender have?

Williamson: Blender doesn't actually have any dedicated retopology tools by default. Instead it has a bunch of tools that just so happen to work well for retopology. I hope to help change this in the future, and have had many discussions with the modelling developers to do exactly this.

This lack of dedicated tools is not really an oversight, it's simply a reflection of how fast sculpting has totally taken over organic (and, in some cases, hard-surface) modelling workflows. When I started modelling in 2003, digital sculpting barely existed. Everything was poly modelled. I'm not even sure the concept of retopology existed in most artists' minds.

SEAN KENNEDY

openvisualfx.com

COMPOSITING

3D Artist: When and why did you first start using Blender?
Kennedy: I first started using Blender in around 2009 at Rhythm & Hues Studios. I was a lead compositor, and I would sometimes make my own small 3D elements for shots I was working on. I had been a 3ds Max user since version 1, but at work we were not allowed to install software. I would go home at night and make my 3D things, then I'd email the rendered frames to myself at work. I started learning Blender because I could download it to my work machine and it ran without installing.

3D Artist: How does Blender handle compositing?
Kennedy: A big challenge in any compositing work are the green-screen keys. Of course the tools today are better than ever, and Blender has a great keyer, on par with any commercially available keyer. Edges are always an issue though, as they are with any keyed shot. They often come out too dark or too bright, depending on the shot and your initial key pull. One of my favourite techniques is to dilate the matte a small amount, then use the Inpaint node to extend the edges of the keyed footage a bit, which brings the correct colour out further than the matte edges. I then swap in the original matte.

PRO TIP

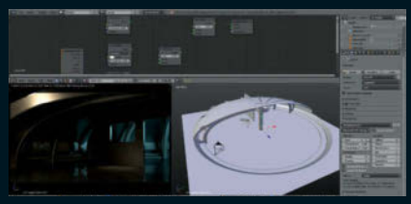
Do not get obsessed by software. Every time I get a job, I have to learn new software, even after being in this industry for 14 years. They all put footage A over footage B. If you know the techniques, the software almost doesn't even matter.

3D Artist: In terms of compositing, what do you think are the hardest scenes to work on?
Kennedy: Things that can be extremely hard are also sometimes things that sound like they may be relatively easy. For example, say you wanted to make an actor or actress appear thinner in a shot. You can't just scale the image, obviously. You have to isolate every part of them and, depending on how they move, scale them or warp them, or perhaps even completely replace parts with 3D parts. Then there's the background that is going to need repairing, since you'll be revealing parts of it that were originally covered by the actor.

When you get the note from the client that it just looks 'too CG', figuring out what's wrong can be daunting. Maybe the Bump maps or Reflection maps aren't detailed enough, or the geometry has perfectly sharp edges.

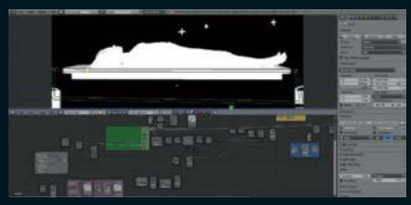
In 2D, it could be something as small as motion blur on rotos, or maybe the light wrap isn't natural enough. It could even be the individual channels of the grain being applied to the image. There's also black levels and white levels. Brights and darks absolutely must match between the different layers of footage, or they will never look good together no matter how good the key. This isn't just true for the luminance levels, but the subtle colouration, as well.

COMPOSITE AN ALIEN ABDUCTION SCENE

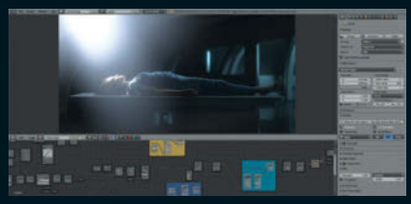


01 Shade and light the scene For this green screen, the background is CG. It's a simple model, since it will probably be slightly out of focus. I only build what I know is going to be seen by the camera. Most of the time here is spent on shading and lighting.

02 Start rotoscoping I bring in the green-screen footage and begin rotoscoping where needed. I garbage roto out the equipment from the set and the bottom of the table. Later, once I've started keying, I'll make a couple of rotos to patch matte holes.



03 Correct edges I work on pulling a clean key from the footage and apply the garbage masks created earlier. Her skin edges require a different key from the rest of her edges, so I blend those mattes together to get the final one.



04 Colour the scene I colour correct the footage to match the colour tones of the CG background. I do some light wrap to bring some of the background colour into her edges, and then a slight edge blur after that. I create the spotlight using the masks I created, and finally add film grain to match the rest of the film.

GLEB ALEXANDROV

creativeshrimp.com

LIGHTING

PRO TIP

To create awesome digital lighting, embrace your aesthetic perception. I'm 100 per cent sure that if you want to understand lighting you need to reverse engineer what you see and feel. You need to connect your life with CG that you create.

3D Artist: When did you first start using Blender in your work?
Alexandrov: I quit my day job as a 3D modeller, and decided to make a living doing what I really wanted: weird graphics, that's it.

After some lazy weeks of doing absolutely nothing related to CG, I spotted a contest on the **Render.ru** website. It was called Her Majesty's Air Fleet. Bam! I was hooked. As I love steampunk and Victorian England, I just couldn't miss it. I used Blender, and I won that contest. Immediately I started the Creative Shrimp blog (it was called Blender Game back then). I was hyped to share my joy.

3D Artist: What is your lighting workflow like?
Alexandrov: I see many aspiring artists struggling with understanding what makes awesome images. I'm getting emails that say "Hi Gleb, I created this render but I feel that something's off with it". Honestly, I know how frustrating it feels. But here's the good news: nine times out of ten the reason behind this frustration is lighting. As photographers say, 'without light there is no vision'. And we just tend to use lighting as a tool to make our 3D scenes pretty. That sucks because lighting is so much more than that. That's what I'm tackling in my book *The Lighting Project*.

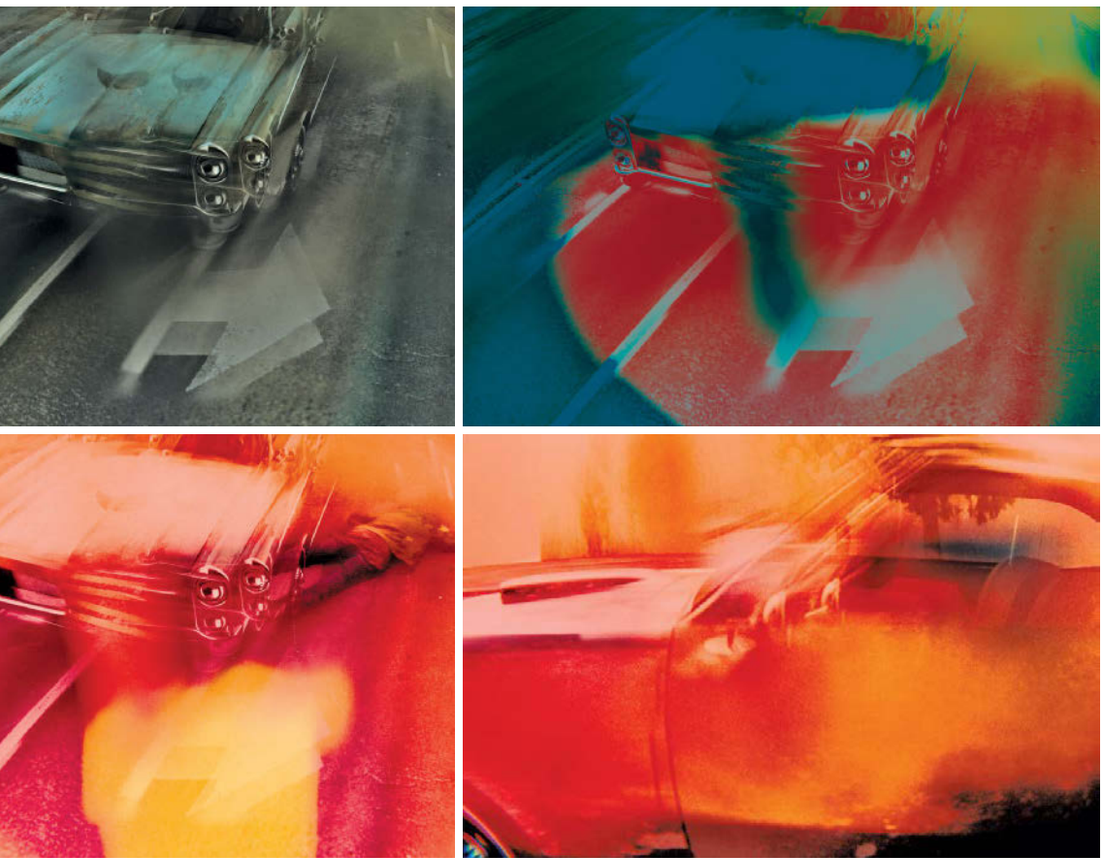
We all know and love the three-point lighting workflow. You start off by having a subject or a scene and you set up three lights to make it look appealing. First you set up the key light to reveal the shape, then you set up the fill light to illuminate the shadow areas. Lastly you set up the edge light, which is meant to separate the subject from the background and give it a cinematic touch. Cool. But you know what? Three-point lighting is not the only way to think about lighting.

3D Artist: Lomography has really influenced your style, hasn't it?
Alexandrov: The lomography movement (**lomography.com**) was a huge discovery for me. It gave me hot techniques and totally outlandish perspectives on lighting. And you know I try to incorporate all the weird stuff that I can find, in *The Lighting Project*. Weird stuff is my bread and butter.

Try simulating optical defects. Start by creating a lens and placing it in front of the camera, like in the real world. Any refractive elements will work, as long as your software has ray tracing. Make it matte and see how the light is smeared across the lens. Seeing the effect in real-time (perhaps in Cycles' real-time viewport) is the best way to do it.

Or you can imagine that every film responds to light in a different way, some films clip the whites, some wash out the blacks and some apply a tint to a mid-range. Manipulate the RGB curves to create your unique brand of film.

To simulate light leaks in 3D, once again stack a few refractive planes in front of the camera. Then you can throw all kind of textures in to control the distortion, the roughness and the colour tint of the lens. You can even mix renders from different cameras, using the



Overlay blending mode. Usually I do it in the Blender Compositor or I have a think about chromatic aberration, dust, scratches and grain. The film grain effect may seem unnoticeable, but believe me every small detail contributes to the final look.

3D Artist: Do you think that Blender has any lighting weaknesses?
Alexandrov: No doubt, Cycles (Blender's ray-tracing engine) is the best thing since Ton Roosendaal invented Blender itself. It covers pretty much every need of my workflow. Global illumination? Check. Interactive viewport? Check. Powerful shading system? Check. Of course, some things are lacking such as directional light support. Come on! Of course, Cycles has a sun lamp, but it would be cool if we could constrain its area of influence. With directional Light, it would be good to include or exclude an object from the illumination per light source. And the biggest problem for many Cycles users is its speed versus noise ratio. Of course when you know the tricks such as Light Clamp, Light Path and Multiple Importance Sampling it gets easier, but for newcomers the noise is a nerve-racking monster.

3D Artist: What are the hardest types of scenes for you to light?
Alexandrov: The deeper you go down the rabbit hole, the curiouser and curiouser it becomes as Lewis Carroll said. Digital lighting is no different. If you go beyond the three-point lighting scheme, it becomes tricky.

For example, if you play with extremely high-dynamic-range lighting it is not obvious how to display it properly... The creative process of tone mapping an extremely high-dynamic range to the display colour space is where all the magic happens.

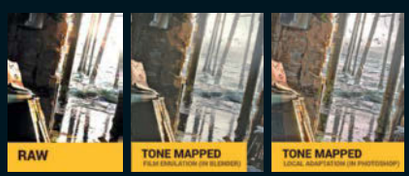
The hardest part is to stop thinking in terms of light position and softness. What matters the most in such scenarios is how you set up your viewing device, be it a camera, a human eye or whatever else.

5 ESSENTIAL LIGHTING TOOLS

Gleb Alexandrov reveals the lighting assets he couldn't live without

VOLUME SHADERS To simulate atmospheric effects use Volume Scatter and Volume Absorption shaders. It's essential in simulating fog and other volumetric effects.

AREA LIGHTS These lights are a crucial (and the most commonly used) weapon in our lighting arsenal. We use area lights as often as photographers use softboxes.



FILM EMULATION With film emulation and RGB curves we can affect the display of colours and lighting. We can simulate an old analogue film response to light, for example.

BAKING To transfer the lighting to an engine, just bake the lighting information into textures. Create UV unwraps, choose the Complete map and press Bake.

ROUGHNESS Just by tweaking the Roughness parameter alone, you can create materials ranging from chrome to rough metal, from wet mud to sand.

JULIEN KASPAR

artstation.com/artist/julienkaspar

SCULPTING

3D Artist: What are the biggest sculpting challenges you face in Blender?

Kaspar: In terms of sculpting there are things I miss from ZBrush like the ZRemesher, the Transpose Master plugin, the large scope of brushes and more. You can get some of these in Blender as add-ons but in the end it still isn't as fast and intuitive as ZBrush. To make up for that I make good use of the modifiers in Blender and switch between sculpting and poly modelling, which always lets Blender stand out. Also, some tools can be hard to notice. For example I didn't know for a long time that there is a feature like Spotlight for Blender in the texture options for your sculpting brushes. So I stay informed about new features and tips and tricks from the community. And where ZBrush can display millions of polygons without getting slow, Blender is less powerful in that regard. So I always use Fast Navigate in the Tool Shelf, disabling Outline Selected and enabling Backface Culling in the properties.

PRO TIP

In the end it all boils down to determination. When I started with sculpting my results looked terrible, so I kept on going. Make a collage of reference images to guide you, and no matter how long your model looks bad for just keep trying until it doesn't.

3D Artist: What are the hardest objects to sculpt?

Kaspar: Even though the performance can be enhanced it is still hard to sculpt objects with a high polycount. I tend to keep my models in multiple different pieces so that I can isolate the ones I sculpt if the viewport gets slow. If it gets to high-detailed surfaces like cloth or skin then painting textures is also a viable option. I do this either directly in Blender or in Photoshop and GIMP.

Dyntopo gives you the advantage of deciding where the mesh gets more detailed in a dynamic and comfortable way but the result almost never looks as clean as when you are doing it with a subdivided mesh with decent topology. But apart from that, I'd say there are enough ways available with the brushes, options and tools to sculpt anything you want. Even complex and abstract sculptures can be achieved by playing around with the modifiers, the particle and the physics systems.

JULIEN KASPAR EXPLAINS HOW HE UTILISES DYNTOPO IN HIS SCULPTING PROCESS

01 Sketch shapes I start by sketching out simple shapes as a base mesh. I use the Skin modifier and simple spheres sculpting them with the Snake Hook, Draw and Inflate brushes. I prefer Snake Hook over the Grab brush because of its falloff while moving the mesh. When I am happy I move on to sculpting with Dyntopo.

04 Add details After the retopology is complete I subdivide the mesh one or two additional times and shrinkwrap it to the original sculpt mesh to pick up most of the shapes and details. After that I smooth out some stretched areas and sculpt further detail with the Multi-resolution modifier.

02 Sculpt with brushes I keep Dyntopo at 3-5 px detail size and at Subdivide Collapse. I sculpt rough shapes with Clay Strips and Crease. With hairstrands and parts like that I use Snake Hook with the strength curve set to sharp, and adjust the thickness with Inflate and Smooth. After, I switch the Dyntopo to Subdivide Edges so that no details get accidentally destroyed.

05 Paint objects I usually like to paint with vertex colours at a relatively high subdivided mesh by applying the Multi-resolution modifiers. That way I don't worry about texture size and UVs and can directly paint. However, it's important to keep an eye on the polycount and isolate the objects you paint because the viewport tends to get really slow at this point.

03 Retopologise I merge some objects using the Boolean Modifier or the Sculpt UI add-on. I try to keep it simple and subdivide the topology and shrinkwrap it to the surface. Sometimes when I have little time I use ZBrush for quickly retopologising objects as a foundation and adjusting the topology further in Blender.

06 Composite in Photoshop I love to render lots of layers with isolated light sources, shadows, ambient occlusion and more. Then I re-create the render with layers in Photoshop and adjust contrast and colour, paint additional atmosphere and details and give the image an overall painterly touch.

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ULTIMATE
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> The benefit of sculpting in a full DCC application such as Blender is that you have the ability to apply any tools of the software to accelerate the process

Non-destructive modelling in Blender

Explore alternative non-destructive modelling methods and learn how to kitbash with Blender and Houdini

JÜRI UNT
Blender AstroMonkey, 2016

Software
Blender, Houdini Indie

Learn how to
- Set up workspace efficiently
- Work non-destructively
- Crease and bevel
- Utilise modifiers
- Use multi-axis symmetry with the Mirror modifier
- Set up advanced Arrays
- Synergise with Houdini
- Use Booleans (including OpenVDB)
- Kitbash and linking reference
- Isolate components to enable easy editing
- Set up automatic UVs
- Create dust and edge wear

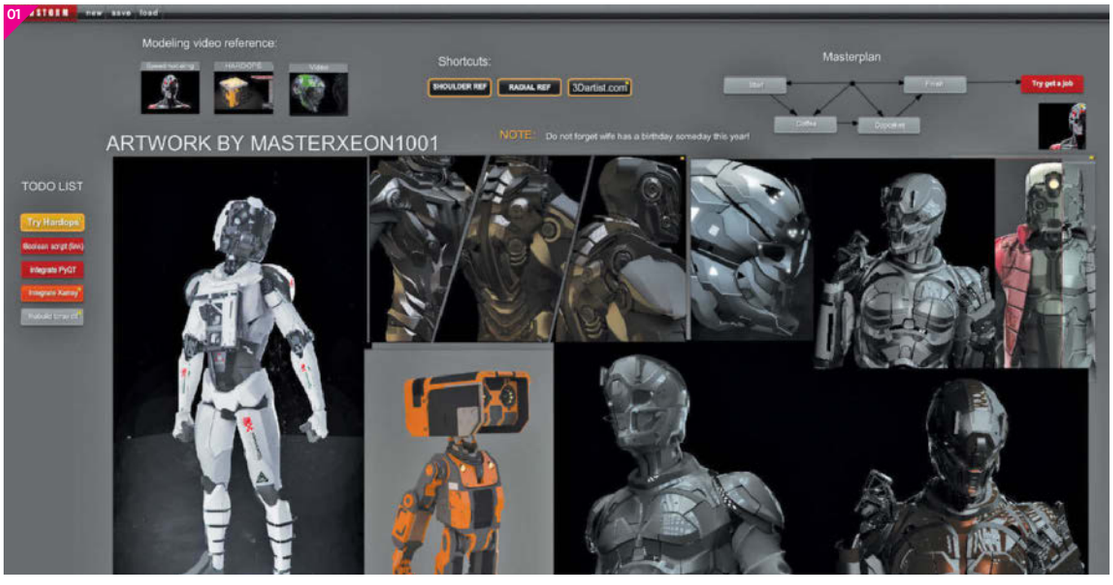
Concept
Behind every digital artwork there are countless hours of hard work by the developers. This Blender-themed project was a way of familiarising myself with their tools, as well as a way of expressing gratitude by referencing all of the kind people who empower us with their technology.

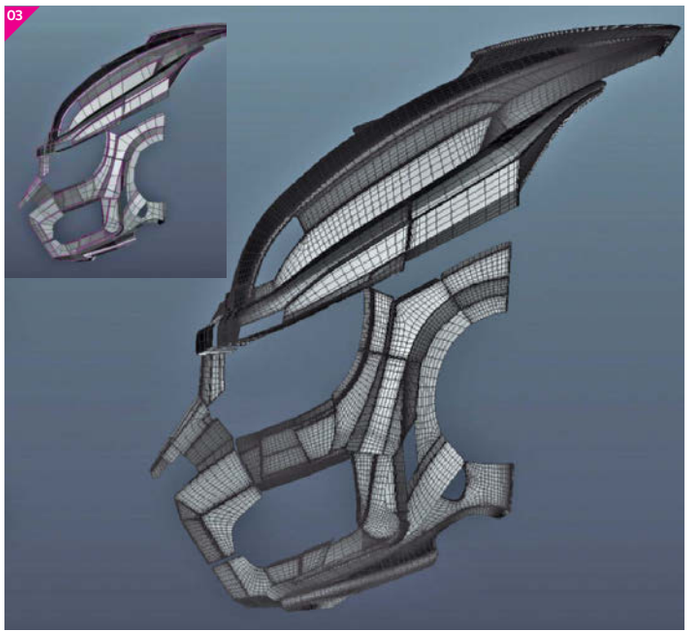
YOUR FREE DOWNLOADS from **filesilo.co.uk/3dartist**
- Tutorial screenshots

We are going to explore alternative hard-surface modelling techniques in a semi-procedural, non-destructive setting – to do this we will break down the AstroMonkey render. This tutorial will build on already dominant workflows such as sculpting, subdivision modelling, kitbashing and Boolean operations with an aim to bypass linear execution and many of the other limitations that they can sometimes impose. By the end of this article you should have an overview of how to efficiently work within Blender's powerful ecosystem as well as how to utilise both Blender and Houdini in a way that is complementary to your existing workflows and applications.

01 Set up the workspace This topic is often underestimated but is the core foundation of any strong artwork. It is also vitally important to display it efficiently so you get all the information, but are not helplessly cluttered to a point that you might ignore it all together. There are very good reference viewers like Kuadro available for free. We use a self-developed mindmapper that was designed for teamwork (with nodes, texts and planning) – it features sub-categorised image and video-based reference viewing on an infinite virtual canvas. For the primary reference, though, we will use Blender itself as it has very customisable and efficient UIs. Setting up several image panels is recommended, but it is also important to feel in control of your workspace and avoid having unused panels cluttering the screen! The most important thing to remember is that you can easily switch between all panels using Shift with the F1 to F12 hotkeys to show only the relevant panels as and when they are needed.

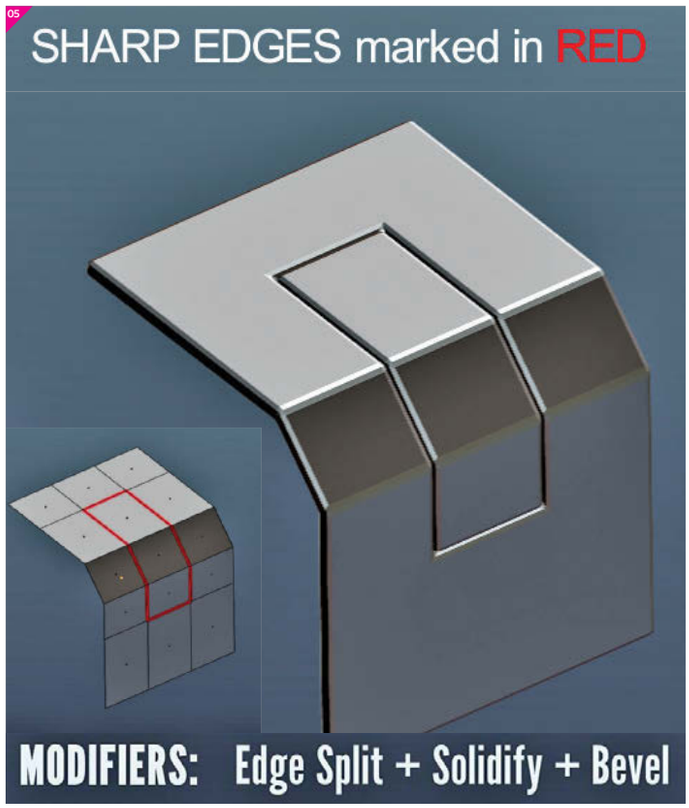
02 Define the base You can start with sculpting or a 2D concept. Sculpting has the benefit of a quick exploration of conceptual shapes in 3D space. You can use any application that you feel comfortable with, however the benefit of sculpting in a full DCC application such as Blender is that you have the ability to apply any tools of the software to accelerate the process. This includes use of traditional modelling tools, adding primitives and curves, modifiers (Lattices, Booleans, Arrays and so on), multi-axis symmetry and a lot more. You have the option to spend as much time on the design as you wish, depending on whether you will retopologise it closely or choose to explore it artistically by using traditional subdivision modelling. We worked quickly and minimally, as none of this data gets preserved.





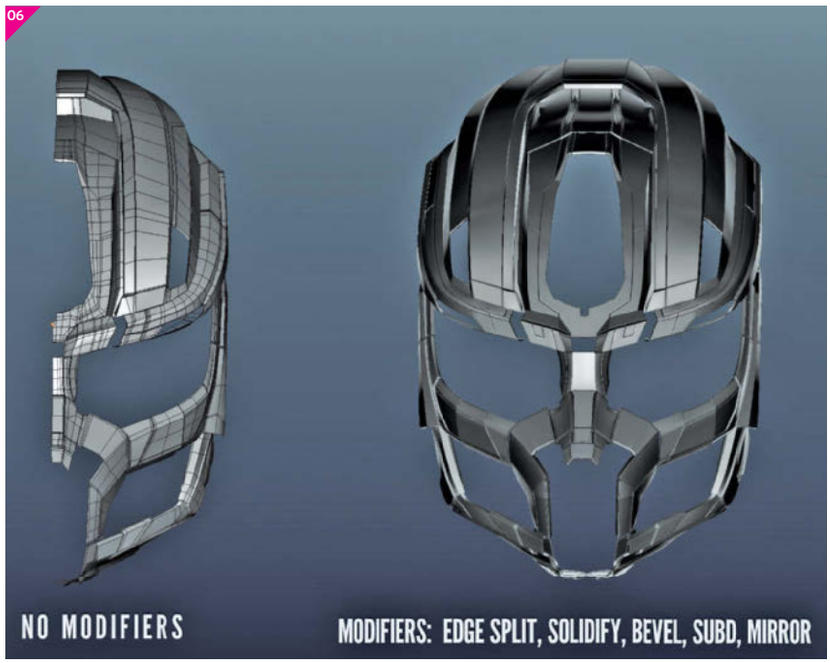
03 Model subdivisions and crease Blender enables us to keep topology light and manageable, while dynamically creating most of the surface features through use of modifiers and other non-destructive techniques. We will work with subdivided surfaces as we are are interested in smooth, curved forms that are significantly harder to achieve than commonly used flat, planar surfaces. By adding a subdivision modifier to stack we have the option to use Edge Creasing to define hard corners without making any changes to our topology. This is very similar to other OpenSubD-supported applications, however Blender also has a very unique alternative called Edge Bevel. Setting bevel weight is nearly identical to working with creases but it dynamically bevels the actual mesh around the specified edges. The result is very clean and comes with a lot of control exposed by the modifier. The main benefit of using it over creasing is that it does not require heavy subdividing to see the effect, and it also exports very well in a variety of formats where creasing information would get lost. It is advisable to explore both techniques as you will apply them together.

05 Use Solidify and Angle Limited Bevel We can give our flat panels some thickness by adding the Solidify modifier (the 3ds Max equivalent is Shell). Since we are working with subdivision surfaces, the newly dynamically extruded form would become rounded if used prior to the Subdivision modifier. We can fix that by changing the Creasing parameters of the Solidify modifier in the Properties panel. An even better alternative is adding a Bevel modifier after Solidify, with Angle Limit mode. This will automatically detect the hard edges (corners) and dynamically bevel them. As a result we get very nice rounded corners that work perfectly with the Subdivision modifier.



04 Work with multi-axis symmetry The Mirror modifier (the 3ds Max equivalent is Symmetry) is an essential modifier. Using symmetry is a relatively simple topic, but it's good to understand how to make the most out of it. More specifically, very often we are dealing with both local as well as global symmetries. For example, the shoulder group hosts over 40 objects, each mirrored around a common custom object with a custom rotation. The result of that is also mirrored globally in an x direction. This can be achieved with two Mirror modifiers, each referencing a custom object that defines the mirroring position as well as the axis. We could work with instances (scale.x=-1), but this causes a massive overhead of managing and a lot of other errors (problems with normals, scene clutter, no welding and so on). Instead the Mirror modifier provides us with an efficient way to control our scene as we can disable the modifier at any time. More importantly it also welds the middle points of all objects based on individual thresholds, and enables us to break the uniformity by varying its order in the modifier stack! With many objects in the scene (over 400 in our case), the Mirror modifier can literally do half of the work for you.

06



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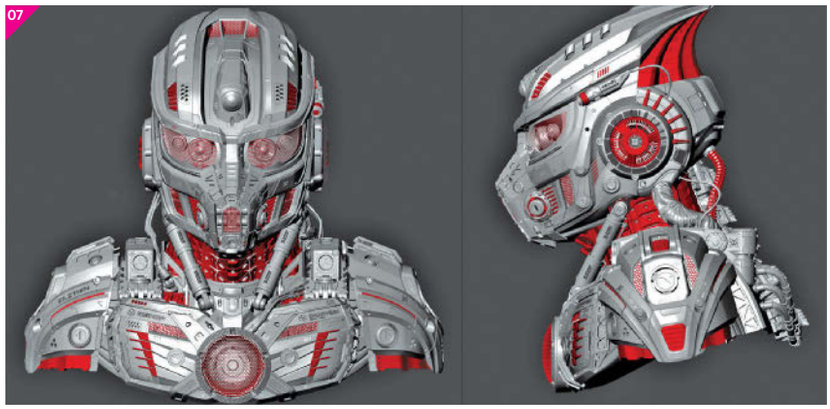


08

> “Blender comes with a very powerful Array modifier – it enables us to create a sophisticated dynamic duplication of base meshes”

Array control

Arrays do not have to be uniform looking, nor flat. We have a lot of control thanks to modifiers. Very often you would use them together with Shrinkwrap or Lattices to conform them. Grids, for instance, can be thickened with Solidify, beveled and combined with Booleans to cut out specific shape of interest. The possibilities are many! The elegance of it is that we only have a very simple base object to worry about as modifiers do all the work for us.

06 **Split edges** We are now beginning to see the true benefits of modifiers, while our topology remains light and fast to edit. We can exploit this minimalism even further by adding an Edge Split modifier as the very first modifier in the stack. By selecting edges and applying a Make Sharp operator, the Edge Split modifier unwelds (splits) these edges from one another. In combination with Solidify and Subdivision (subsurf) modifiers we get very beautiful, real, lifelike panels while still maintaining very light topology.

07 **Create shapes with dynamic arrays** Arrays are absolutely crucial for defining complex shapes. Blender comes with a very powerful Array modifier – it enables us to create a sophisticated dynamic duplication of base meshes in the form of directional arrays, grids and radial arrays. Standard directional arrays are essential and need no introduction. More complex shapes, such as grids, can be created by simply combining two Array modifiers. You would use a fast-to-edit repetitive shape, which is similar to using patterns in a 2D app, which are instanced in the x and y direction. Since Array modifiers have the default option for Relative Offset, it ensures that each duplication is aligned side by side and can be welded to a previous one to create one seamless geometry piece. Blender offers you many ways to define radial arrays dynamically. The easiest way is to use Array modifier in combination with a Simple Deform modifier set to Blend mode (360 degrees). An even better way is to use the Object Offset option in the Array modifier, which works by applying transformation difference between two objects to each sequential array duplication. You can simply rotate one of the objects to see the effect.

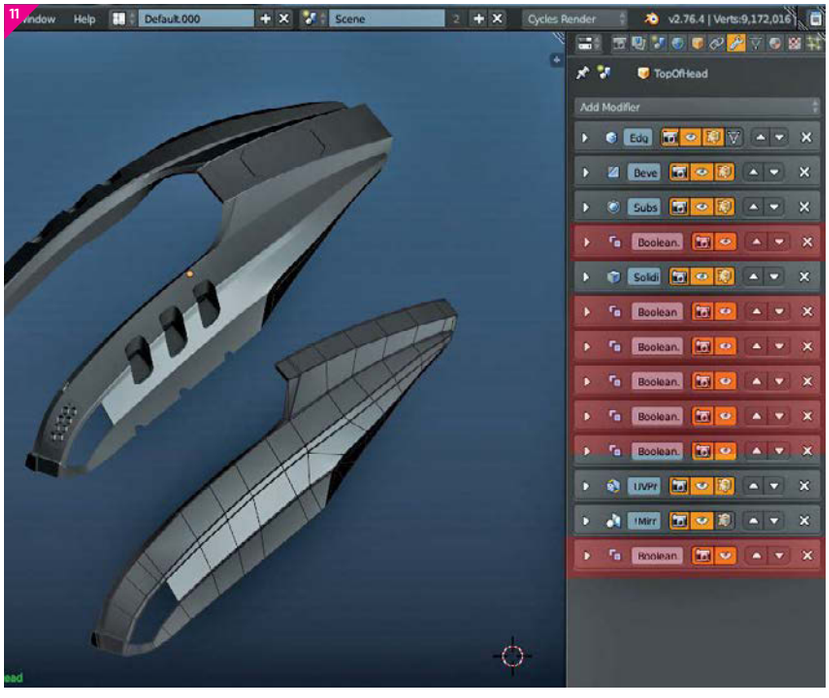
08 **Kitbash methods** We often rely on IMM(s) and kitbashing libraries, however they have several limitations. Bigger pieces are great for certain projects (like mechs) but in general they limit our artistic freedom and dictate the final look. We are interested in an analogous workflow with Houdini, where each component is made of other individual components (nodes). This allows for a real, lifelike hierarchical approach where complex things are composed of many simple things. You can always import kitbash components (such as OBJ files), but we will also rely on asset referencing. To do that, define an independent BLEND file hosting your object library (kitbash components).

Instancing groups

By grouping a complex, multi-piece object, we can effortlessly instance it to our main scene. It's a proxy-like object with only one transformation, which makes it very easy to manage. This is especially ideal when dealing with multiple instances of the same group.

09 Link objects Now you can link or append particular objects to your main scene. This is like kitbashing with the advantage of preserving construction history, material and other data that you might care about. For example you could import a premade grid object (simple pattern) that comes with two Array modifiers, or some optics with all materials set up for you. You can link or append manually, however using a GUI is a far better solution! We used self-developed PyQt-based tools, but can recommend HardOps and Asset Manager add-ons. The latter lets you effortlessly store and retrieve any objects, including kitbash components. HardOps, on the other hand, is a very powerful feature-packed hard-surface modelling add-on with asset-loading functionality included.

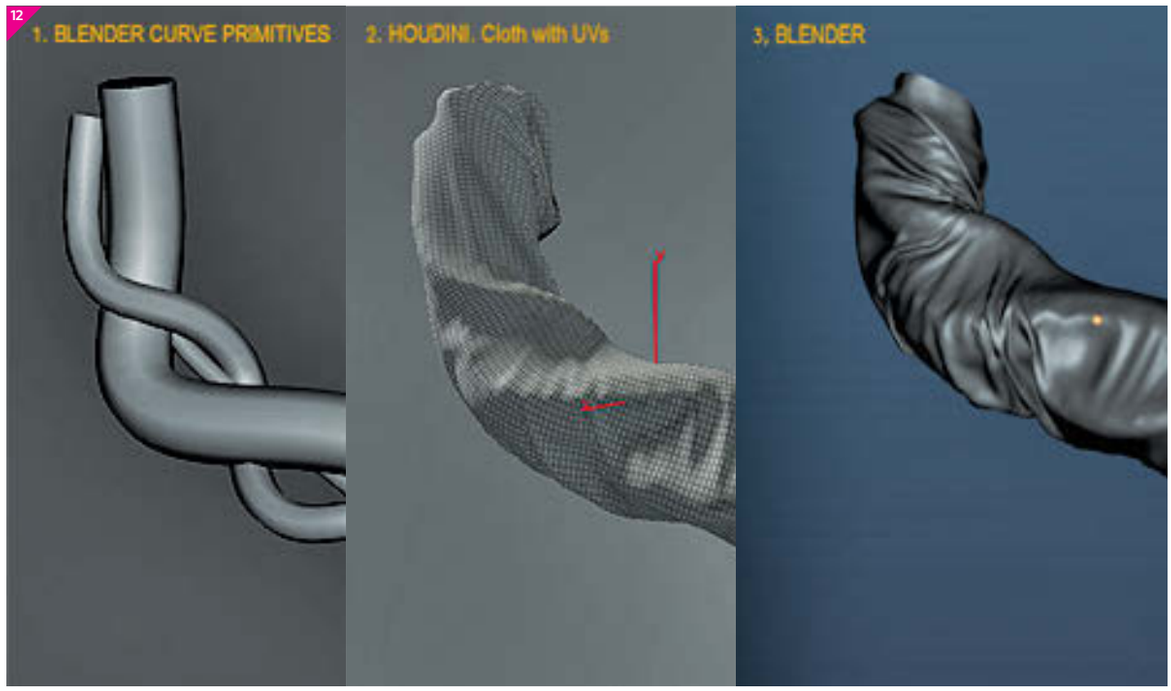
10 Work with isolated components Blender comes with Scenes, and although intended for animation Scenes can be perfectly exploited to model our individual pieces. You can think of Scenes as having several other 3D 'files' within the main 3D project file, with all the data being shared. We can use this to our advantage by allocating individual components to these scenes while retaining data linkage with the main scene – this is not the same as isolating a selection (local view). Instead it enables us to edit these components in the most comfortable, clutter-free environment without custom transformations. In essence it enables us to treat these components as independent artwork with our own details, layers and groups and so on.

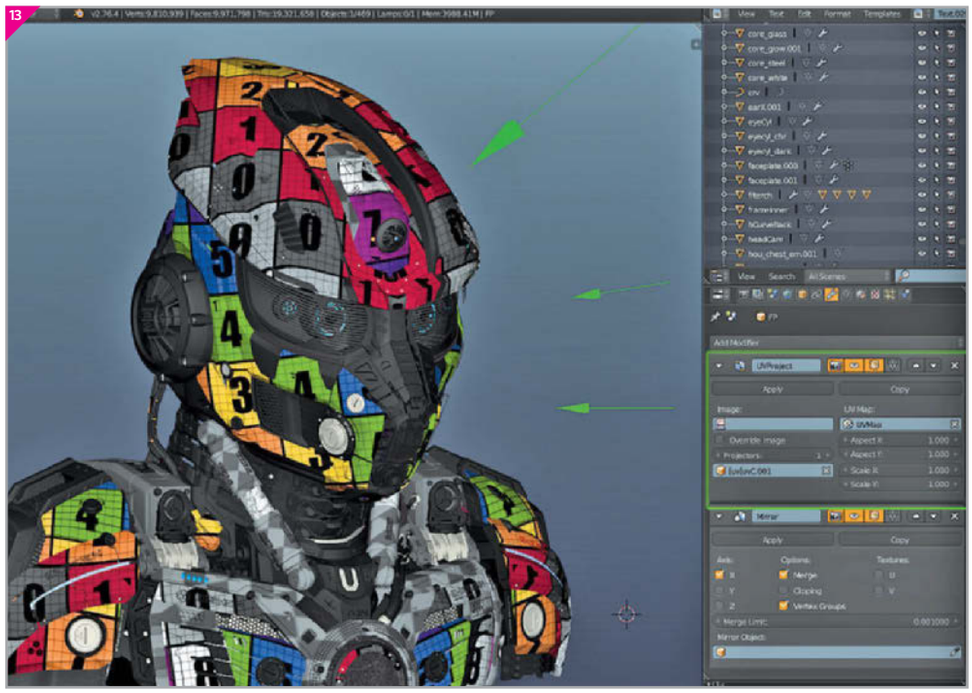


11 Booleans An absolutely critical part of a hard-surface modelling workflow is Booleans. Problematically, traditional Boolean operations are collapsed into the main mesh, leaving no construction history. This makes maintaining them very manual and usually limits us to planar surfaces. In addition, Booleans do not get along with a subdivision workflow, cause triangulation and leave hard edges that require rounded corner shading. None of this is really a problem when you work with modifiers or nodes. In essence it enables us to set up a completely non-destructive and subdivision-friendly construction history. Our meshes remain light and easy to edit while Boolean operations are applied by the modifier non-destructively. If you want to have rounded edges after a Boolean operation, you can quickly add a Bevel modifier with an Angle Limit mode. As a result you eliminate the need for special rounded-edges rendering. We didn't use HardOps as we have custom tools (Python, Qt), but it's highly recommended as it makes work with Booleans effortlessly streamlined. BoolTools is also a good freeware alternative.

Why use Booleans?

What makes modifier-based Booleans especially powerful is that they themselves can host a variety of other modifiers (Bevels, Arrays, Solidify and so on) as can the primary mesh prior and post any Boolean operation. This results in a very diverse and efficient workflow!





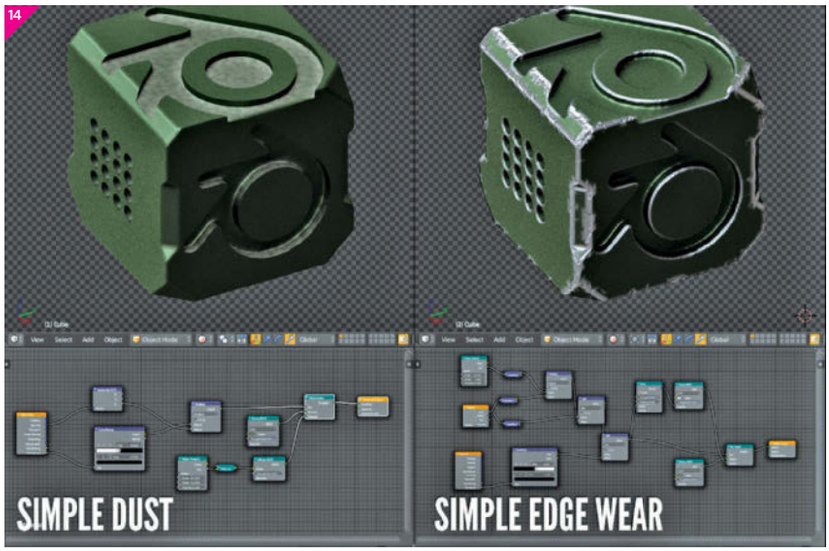
12 Model with Houdini Modelling is often overlooked in Houdini; it's an exceptionally powerful 3D program, however the processes of micromanaging everything and doing nodal modelling can be time-consuming. That is why finding the balance between a semi-procedural workflow in Blender and fully procedural workflow in Houdini was a key part of the process – more often than not, they were used hand in hand. A simple example would be adding detailing such as screws. In Blender, quads were placed onto geometry to mark where screws should be created. This mesh was shrinkwrapped (by a series of modifiers) to underlying objects, which makes it perfectly conform to surfaces even if the topology changes. It takes a moment to export these quads to Houdini, which automatically replaces them with perfectly aligned screws (Copy SOP, stamp). Another example is using Houdini's Cloth simulation to wrap a wire that is artistically defined in Blender. Simulating such things is an iterative process where geometry needs to be updated many times. As such, an automatic setup can save a lot of time. What an artist should take away from this step is that Houdini is not only a very powerful independent procedural modeller – it can also accelerate your work, offer complex plugin-like solutions and automate parts of your workflow when used together with another application.

13 Refine UVs What makes the workflow within Blender especially fun is that we can bypass linear step-by-step execution such as the requirement to complete the model before the retopology stage by doing final UVs, the 3D painting/texturing, and finally shading and rendering – these are all destructive steps that prevent further changes to model! Instead we want to be able to see where the project is going (the look dev) from the moment we create our first mesh. We also want to change the model and fix mistakes as we start rendering. How do we do that? We need to define some basic UVs. Blender offers us a very easy way to do so by creating a Project UV modifier (the UVW Map in 3ds Max). This is planar projection that can be elegantly set up on hundreds of objects. If the mesh is unsuitable for planar mapping, it takes a second to unwrap it manually as the layout is almost irrelevant. We simply want to keep stretching under control. We can also use screen-based mapping and procedural textures where applicable.

OpenVDB Booleans

You can utilise Houdini's OpenVDB volumes for non-destructive Boolean operations. Since you are essentially working with voxelised data, the outcome is extremely fast and stable. As a bonus you also get nice rounded corners that standard Boolean operations lack. In combination with other Houdini modelling tools, the possibilities are endless.

14 **Shade and render** With the UVs more or less automatically in place, we can now do basic texturing (scratches, carbon fibre and so on). How can we achieve more interesting effects, though, such as dust or edge wear? For dust we can read Geometry Normals, isolate up axis and multiply it by the Pointiness (vertex density). It will give us a perfect dust mask in cavities, which can then be multiplied by noise or a dust texture. Pointiness can also be useful for edge wear but it is unreliable unless you pay attention to mesh density near the edges while you are modelling. There are easier alternatives, though: Blender has very good vertex painting capabilities and it only takes a moment to paint the black-and-white mask on the edges where the effect is desired. The vertex paint data can be accessed using the Attribute node, which should be multiplied by procedural noise to get a decent edge wear mask. Remember, you can always retopologise as the very last step, and do the UVs and external texturing in another popular texturing program. Until then, you get very powerful look-dev options right inside Blender without the need to collapse nor fragment your workflow.



15 **Learn some Python** We have learned how to work largely non-destructively utilising modifiers, nodes and various workflow techniques. Our base meshes remain light, subdivision friendly and fast to edit. Modifiers do most of the hard work for us. With the full pipeline set up we can iteratively improve every part as long as needed. As mentioned previously, for the very last step you can always quickly retopologise, bake the geometry data and export for 3D painting to one of the leading applications. We would also like to advise familiarising yourself with Python as it can drastically accelerate your workflow in any application! Blender, in particular, is largely built on Python so knowing that will go a long way. Some of the tools used here are available at blenderartists.org as well as integrated into HardOps thanks to Jeremy Perkins. Lastly, perhaps it is fair if we get a chance to explain this somewhat confusing artwork thematic. It was created with the motive to highlight the hard work of developers that is behind every single Blender artwork!

Showcase

Jüri Unt

Jüri has been fully devoted to 3D since 1997 (with 3ds Max, Maya and Blender amongst others). He works with the full spectrum of CG, with particular interest for modelling, making cinematics (including commercials, trailers, intros and so on), VFX, scripting/coding and game development.

Unnanounced cinematic
Houdini, Blender, Cycles (2015)
Tasked with re-creating an ancient city and VFX shots showing it being destroyed. Jüri used Houdini for VFX and procedurally created a city based on archaeological data.

Hyperion (WIP)
Blender, Houdini (2015)
This is a hard-surface (done with subdivisions) character. The intent was to optimise workflow and prototype modelling techniques between Houdini and Blender.

HOT GEMS Cinematic
3ds Max, Realflow, RayFire, NUKE, After Effects, mental ray (2010)
This casino game trailer was rendered with two PCs, with heavy lifting done in comp (over 200 nodes per scene).

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

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GUSTAVO ÅHLÉN
Sci-fi Landscape, 2016

Software
Terragen 3

Learn how to
- Work with a UI interface
- Use node connections
- Set up terrains
- Work with fractal terrains
- Shade
- Create atmosphere
- Light
- Render
- Improve render settings
- Work in post-production

Concept
Inspiration comes from different sci-fi images in the form of photographs as well as films. We can get inspiration from anything around us and we should connect these separate pieces of knowledge to create something new.

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- Tutorial screenshots
- Final render
- Terragen files
- Video tutorial

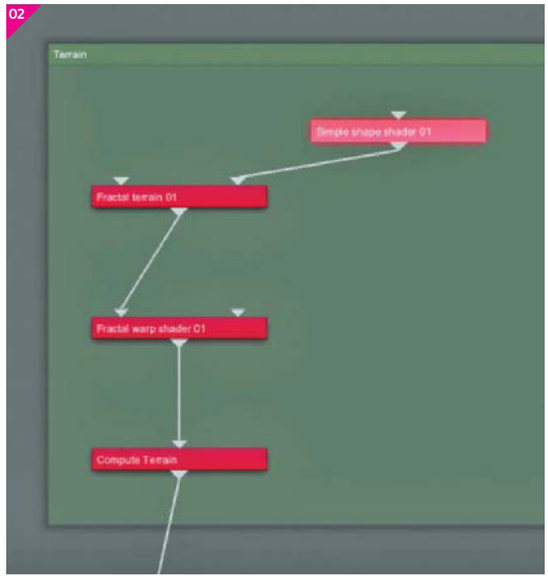
Use shader nodes to create sci-fi terrain

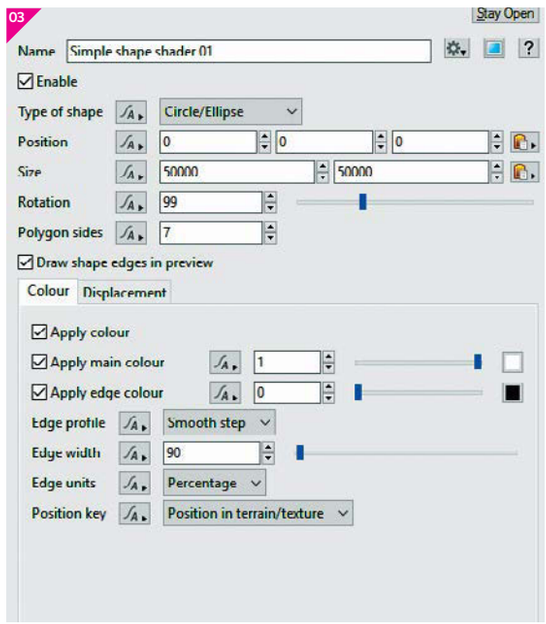
Over the next few pages you will learn how to sharpen your knowledge and skills to improve CG environment work, matte paintings and animations. There are several ways to create CG sci-fi environments by using different software and techniques, but Terragen 3 enables us to develop realistic atmospheres, enhance the final lighting and create detailed terrains – giving us realistic environments. In this tutorial, you will be learning how to use the UI (user interface), how to work with nodes and get more control over the terrain settings, shade the terrains as well as any extra objects, improve the final lighting and work on post-production with the final render.

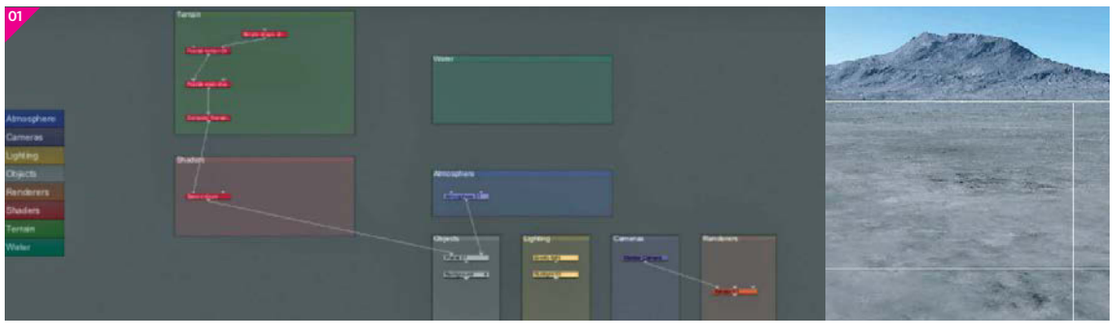
01 Get familiar with the Terragen UI Opening up Terragen, your default screen should look like our image for this step. The upper area will show the preview of the final render, computing each modification done over the lower area of nodes where there are different groups (boxes). These are named Terrain, Shaders, Water, Atmosphere, Objects, Lighting, Cameras and Renderers – the nodes should be in these to keep the workspace organised. The default node connections show how a terrain is composited by nodes. Over each node (rectangle) small arrows are named input, output and so on. These will help you understand how each node is connected.

02 Using nodes and manuals The best way to understand each node in Terrain as well as any other box will be to read the manuals from **terragen.co.uk/wiki** and there you can find good information collection about each node, with amazing examples testing different settings and parameters. During the next few steps you will learn how to configure the default nodes and after these adjustments, we should add new shader nodes.

03 Configure shader nodes In Terrain you can see a default list of nodes, so click on Simple shape shader and configure this node following the parameters of the image on the right for this step. This node will create the different type of shapes as Circle/Ellipse, Triangles, Rectangles/Squares and Pentagons/Octagons. In this particular tutorial we've used a size of 50,000 x 50,000 to create a long map to try to keep the mountains away from the camera. If we delete this node, the mountains will disappear.



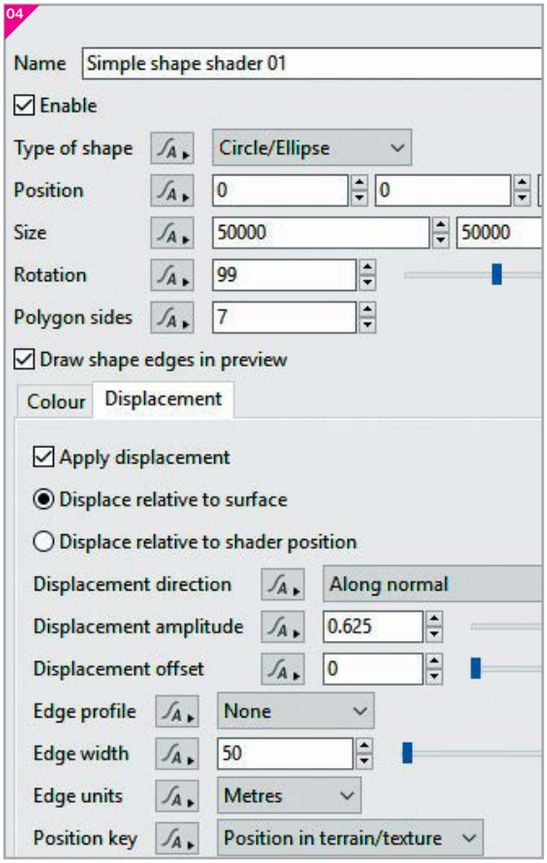




“Terragen 3 enables us to develop realistic atmospheres, enhance the final lighting and create detailed terrains”

04 Learn displacement differences In the Displacement tab we should use 'Displace relative to surface' and a Displacement Amplitude of 0.625. The difference between the displacement types is that 'Displace relative to surface' will follow the displacement of the surface creating an irregular shape, and 'Displace relative to shader position' will ignore the underlying surface and create the displacement from the shader position.

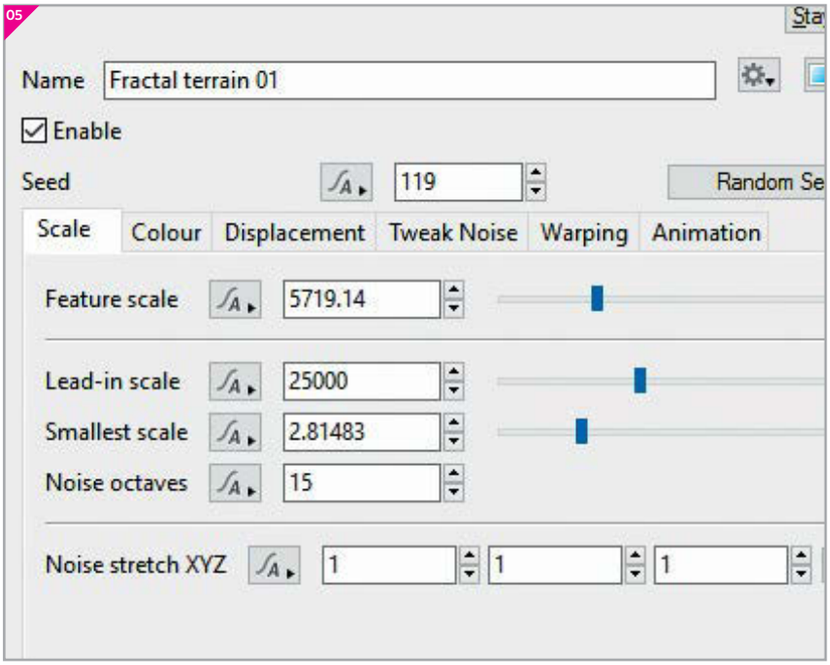
05 Use the Power fractal shader The Power fractal shader is one of the most powerful shaders used in Terragen. This node is based on fractal formulae and it enables us to create and control the distribution and displacement used in any Terragen project. Keep in mind that the fractal's details can be adapted to any scale. Adding grain enables us to create sand or any kind of ground as well as any planetary structures following different scales. This node is used by other shaders to interpret the fractal information as well as scales. In the image for this step you can see all the parameters used for this shader.

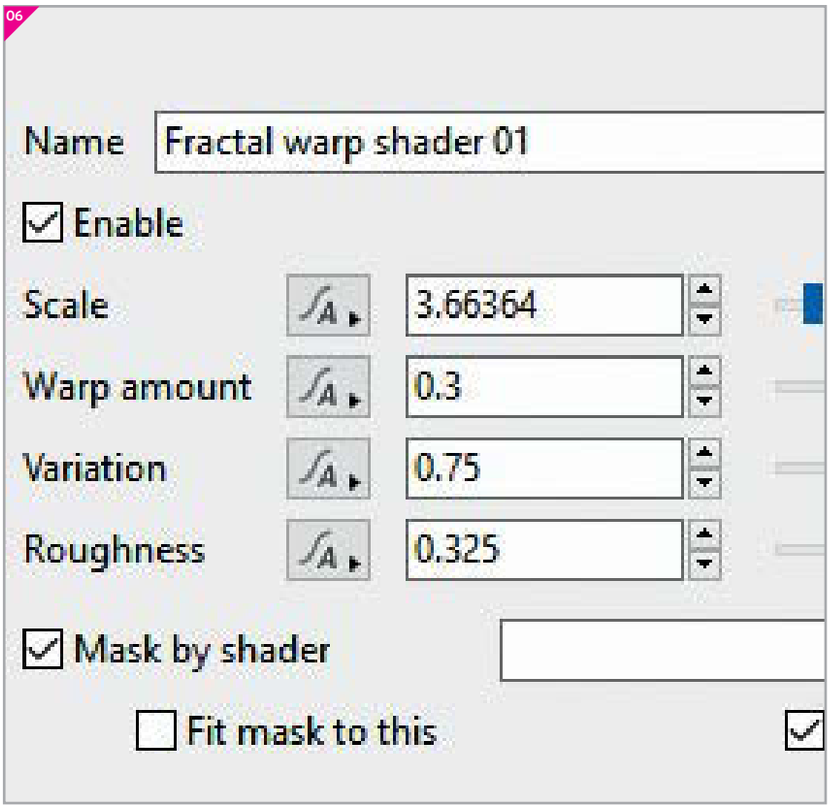


How to add new shaders

In the lower windows right-click and this will open up a new menu where you can see different options. Now if you want to create a new shader, move the arrow over it and this will open up another menu with more options. Keep in mind that each new node has multiple inputs and outputs. The inputs of Mask Shader are used to control where the mask will be added according to the shader that is connected to this slot.

> 'Displace relative to surface' will follow the displacement of the surface creating an irregular shape, 'Displace relative to shader position' will ignore the underlying surface

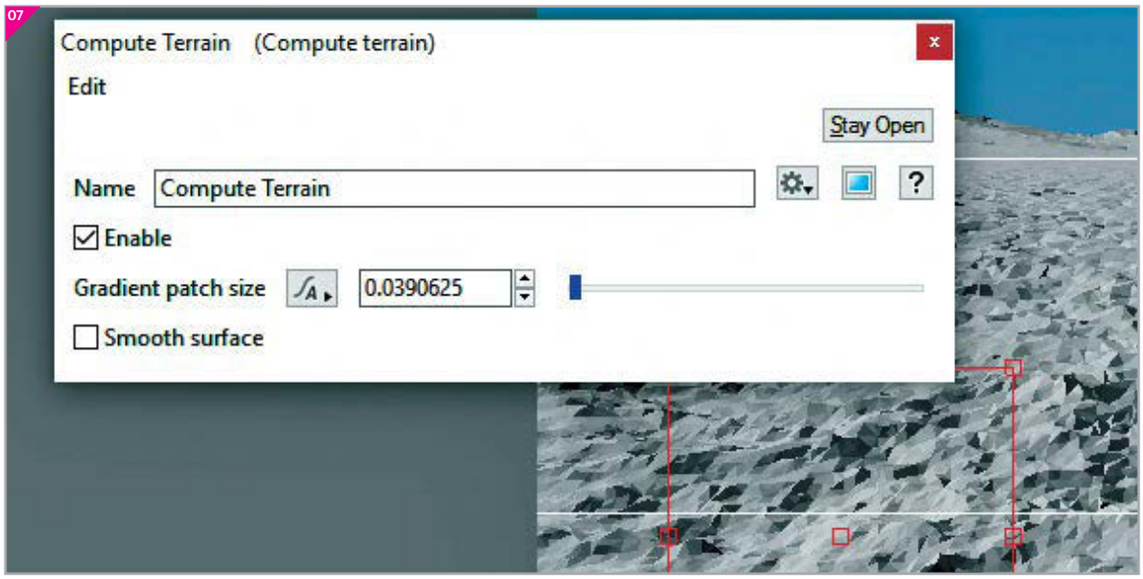


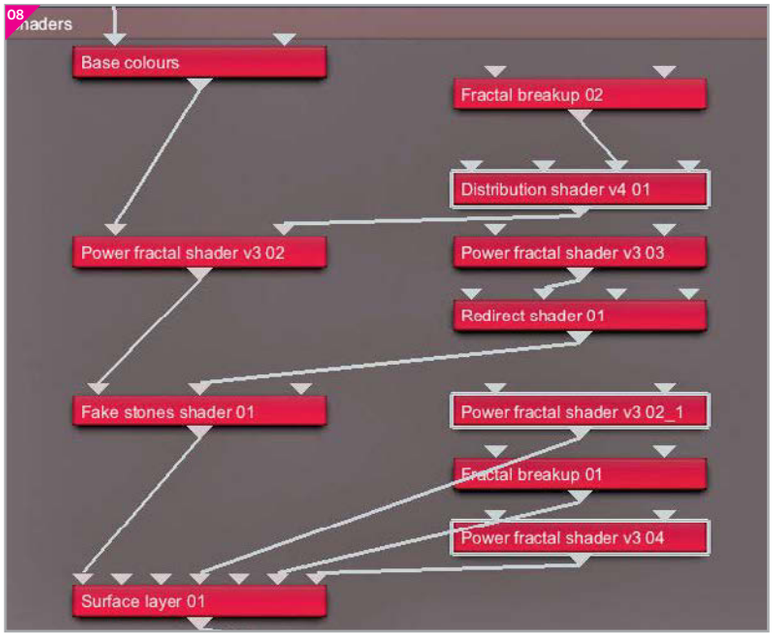


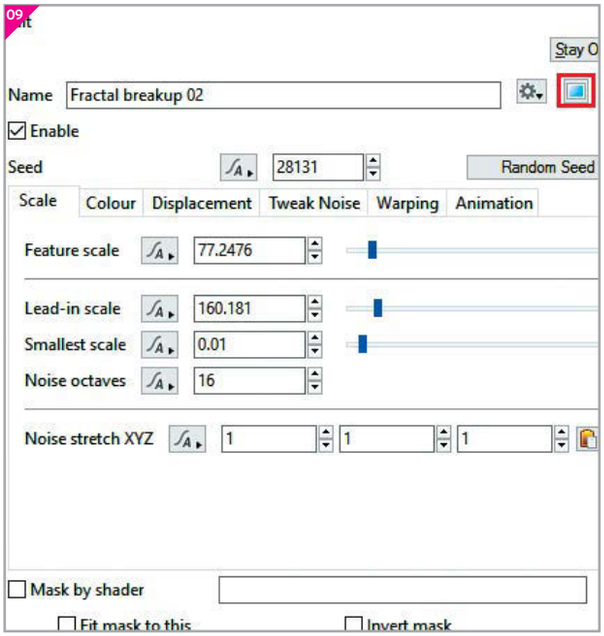
06 Fractal warp shader Warp is all about deformation and this node will add different types of deformations over the surface using different parameters such as scale, warp amount, variations and roughness. If you want, you can also add a 'Mask by shader', controlling the area where this shader will be applied.

07 Calculate terrain

The Compute terrain shader will calculate the surface normal according to the Gradient patch size and it also works updating the texture coordinates to blend the current shape of the surface. When we talk about a normal we are talking about a perpendicular vector to the surface. This option will assist us by encouraging the use of large displacements before the Compute terrain as well as any shaders that are applied after it.





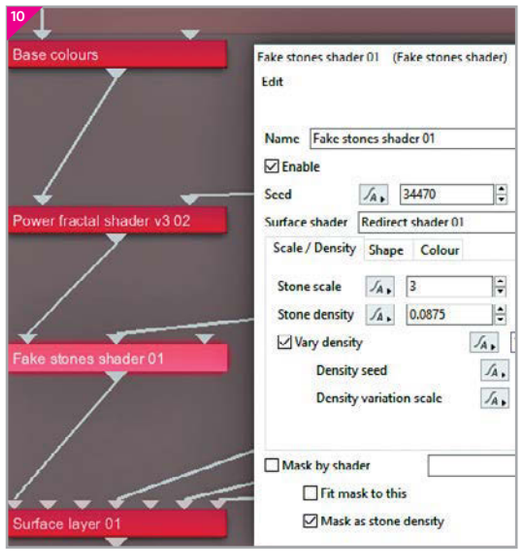


08 Work with nodes

The shader nodes are composed by utilising Atmosphere, the Colour shader, the Displacement shader, Function nodes, other shaders and other Surface shaders. Mostly, we will make use of the nodes Base colours, Power fractal shader and Surface layer. These shaders can control all of the details that are using these nodes, as well as Distribution shader V4.

09 Structure of the terrain shader

When working with shaders we recommend that you take a look at the small icon in the top right under Stay Open (highlighted in a red square in the image for this step), which enables us to get a preview of each shader. The node structure in this terrain has been constructed from the use of a Base colours node to create the base shading of the terrain. We've added a secondary Power fractal shader to control the distribution of the colour and displacement to work as secondary shading, then we added a 'Distribution Shader V4.01' in the Mask Shader slot to control the fractal shading and distribution.

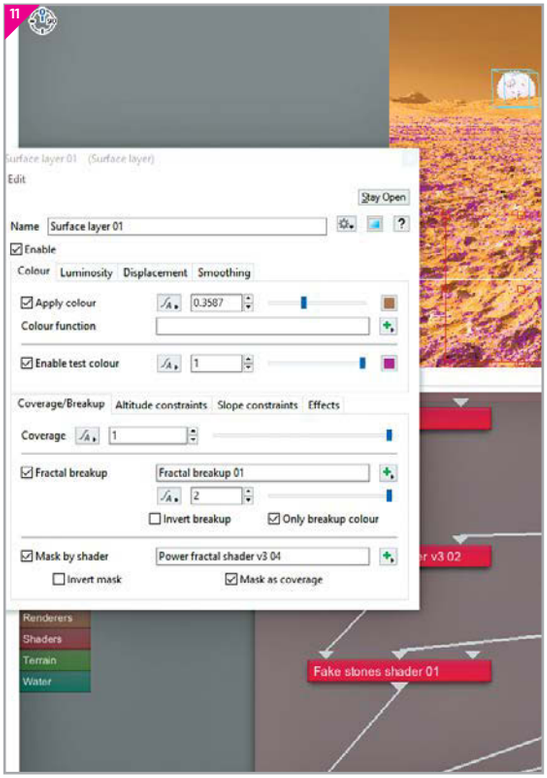


10 Connect to Fake stones shader

Now we should connect the Power fractal shader output to the input of Fake stones shader. This shader is used to create fake stones over the terrain. We prefer to add the Fake stones shader in Shaders because it accelerates the computed terrain. Stone scale will determine the scale of each stone, and Stone density will determine the level of stones over the terrain. If you want to control the density, there is another option, 'Mask by shader', which enables us to add a mask controlling the level of stones and where these stones will be located.

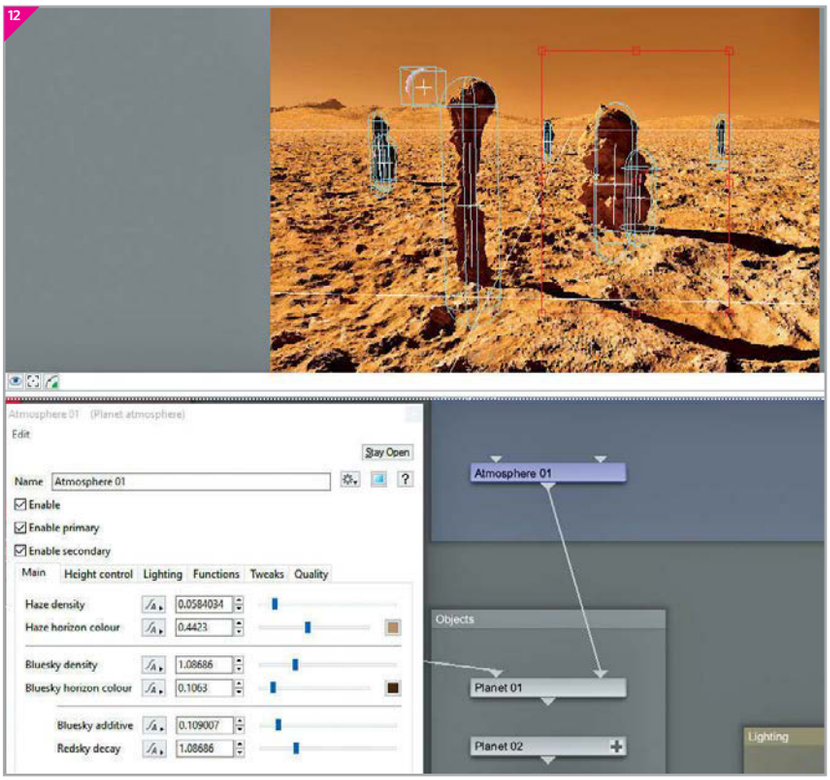
11 Utilise the Surface layer shader Surface layer is an amazing shader as it controls a lot of parameters over a terrain. The option of Enable test colour lets us get a preview of this shader over the surface. Right-click, then go to Create shader>Surface Shader>Surface Layer. Connect the output of Fake stone shader to the input of Surface shader. In Coverage>Breakup you can control the density of this shader. If you reduce the values of this option, the coverage will be reduced. Use 'Mask by shader' for more natural control.

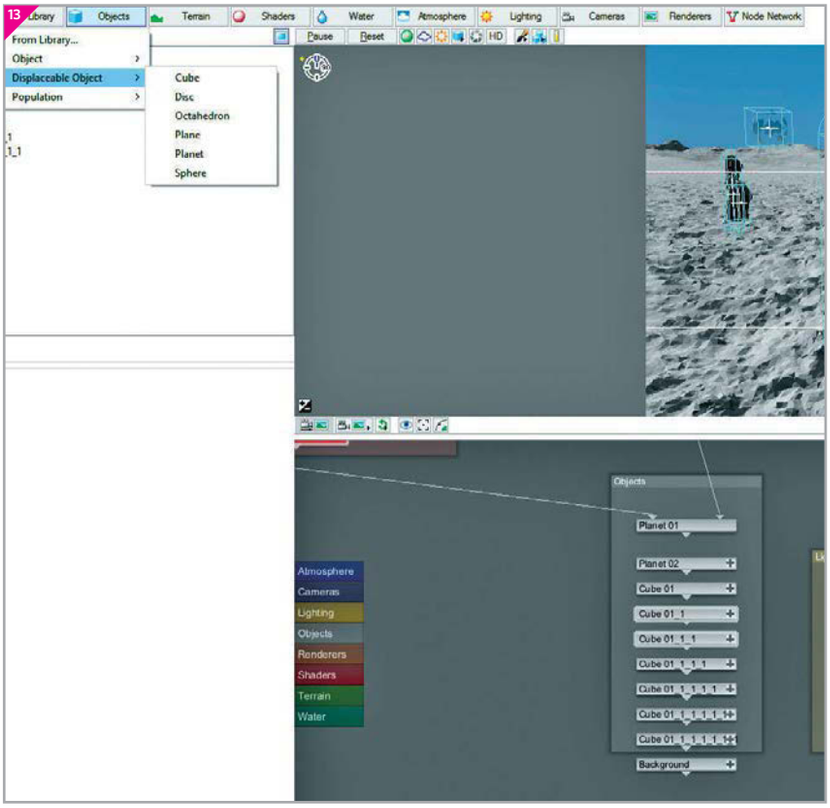
12 Add atmospheric lighting and sky In the creation of the sci-fi atmosphere, we can play with different values of the Atmosphere node. This node enables us to control the haze density, horizon colour, blue sky density, blue sky horizon colour and so on. In this sci-fi environment we used a brown colour for 'Haze horizon colour' and for 'Bluesky horizon colour' we used a darker brown. Try to keep in mind the current values to be added in the final work. In the files for this tutorial on FileSilo you can get all the settings used for this atmosphere.



Lighting

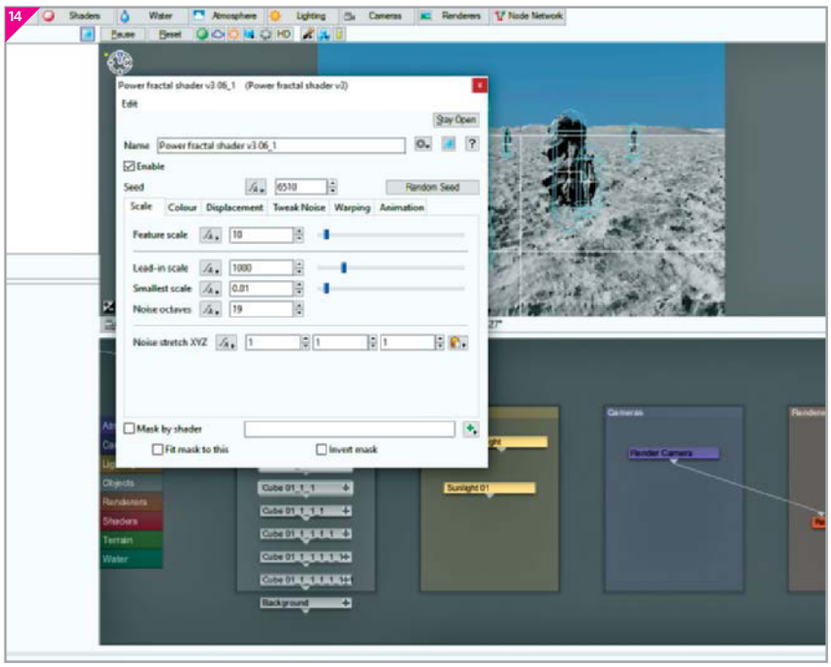
The lighting in any work is fundamental because if we have a brown rock and the lighting of the environment is red, the lighting will overlay the original colour of the rock with a red colour. Then, when you are trying to re-create a planet environment, you need to keep in mind this theory to understand how colours react to the light. Also you can pick colours from images using Photoshop, and once you set this up in Terragen you can re-create the atmosphere testing different lighting colours and learn how any surface will change colour according to the atmosphere.





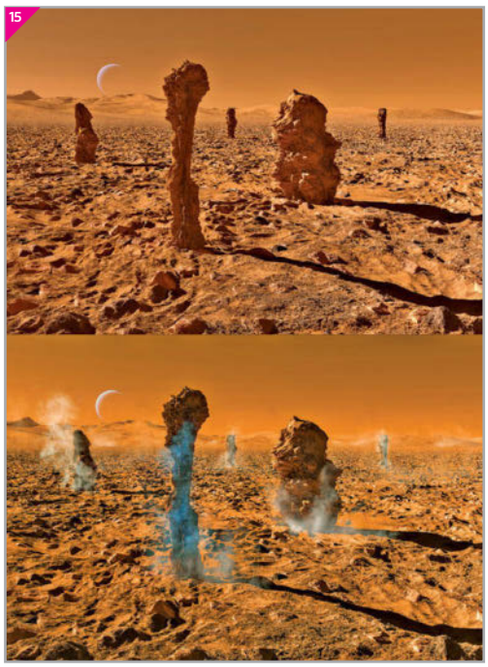
13 Add displaceable rocks You can put in some displaceable rocks to the scene by going to Object>Add Object>Displaceable Object>Cube. Once you have added this cube to the scene, double-click on Cube 01 and in Transform try to centre this object to a visible area. Change Round radius to 15 and then change Size to 10, 45 and 10. In the Surface Shaders tab we should now add in a new Power fractal shader. Once we have added the Power fractal shader, click on the plus icon and select Go to.

14 Displaceable rocks settings Once we have created the base mesh for this rock, it would be a good time to configure its settings. In the Scale tab change the default value of Feature scale to 10. The rest of the parameters should not be changed. Go to the Colour tab and set the colour for high colour as R:185, G:134 and B:89 and low colour as R:134, G:92 and B:54. Go to the Displacement tab and change displacement amplitude to 10. In the Tweak Noise tab set Noise Flavour to Perlin. To duplicate rocks right-click over the node and Cmd/Ctrl+C and Cmd/Ctrl+V. Now move the new rocks to the terrain.



Post-production

This is maybe the most important step because it is a good point for us to control the final render, adding small details, smoke, particles and controlling the curves, saturation and so on. If your final render does not look as you want because you'd like to add plants and rocks, then this will be the best stage for you to control or add any new parameters to the final render. If the sky looks too bright, you can modify this parameter, controlling the contrast levels, saturations and anything else you want. All extra details can be added at this point.



15 Post-production in Photoshop During the final step we should focus on adding new details to the final render. In this stage we added new layers of smoke and dust and mixed these textures with the background (render) using different options of blending. Adding textures of smoke you can blend these textures with the background using Overlay or Soft Light as blending options. Then we can decrease the opacity until we reach a good blending process. Once you've blended these textures, it is time to add noise with a low size to hide the seams. Now add a Photo Filter, blending it with the background.

Showcase

Gustavo Åhlén

Gustavo Åhlén is the founder of Svelthe, a business dedicated to creating concept art, motion graphics and animation for games, commercials and films. Gustavo has also specialised in human anatomy as well as traditional arts. After improving on these skills he began to work in the CG world.

CG Landscape Rocky Mountains
World Machine, Vue, Photoshop (2016)
This was done in World Machine where I created the terrain fractals, erosion and so on using different nodes, then I exported the height maps to be used in Vue.

CG Landscape Mars
Terragen 3 (2016)
This environment has been completely done in Terragen 3, created with fractal terrains using shaders, letting me create and control the displacement noise over the terrain surface.

CG Landscape Snowy Landscape
World Machine, Vue (2014)
This environment was done in World Machine – different nodes were used to create the erosion over the terrain. The displacement and Alpha channels were exported for Vue.

JBPRO332IMM
LOCK
RIGHT
UNLOCK

Bake a low-poly mesh using UV sets

JONATHAN BENAÏNOUS
Real Time Sci-Fi Helmet, 2015

Software
ZBrush, Maya, Photoshop, Substance Designer, Marmoset Toolbag

Learn how to
- Create a nice and clean retopo in Maya
- Master the baking process
- Build fully procedural shaders using Substance Designer
- Exploit your mask to easily create different 'skin'
- Generate a final render using Marmoset Toolbag 2

Concept
I aimed to create a high-definition videogame asset, based on one of my previous pieces of work, to further push my knowledge of shading and texturing within Substance Designer.

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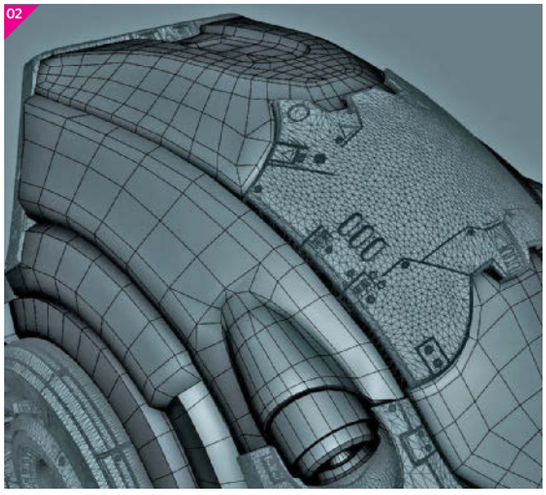
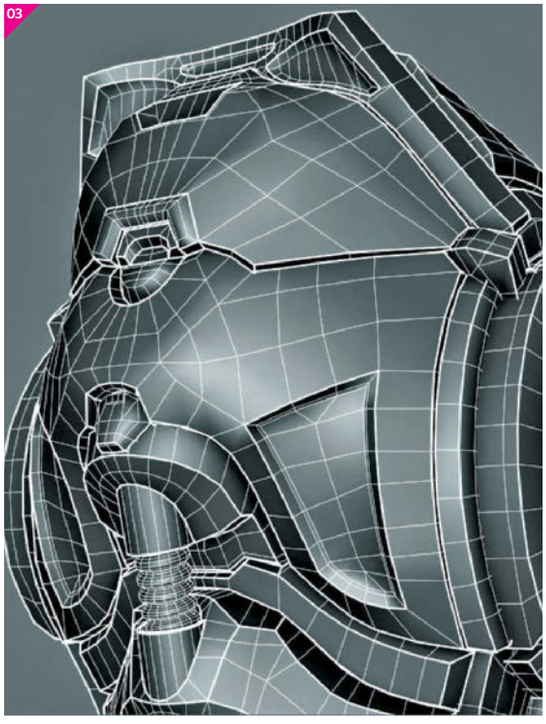
- Tutorial screenshots

The production of a highly detailed real-time asset for use in videogames will demand time and patience, but with hard work comes great results. We will review the method, techniques and tricks that will assist you in reaching this high level of quality. We will learn how to take advantage of powerful tools such as Maya, Substance Designer and Marmoset Toolbag. If you feel any lack of knowledge while working through this tutorial, it is really important to take a quick break and catch up via short examples or videos to fill in any gaps in your skillset and to keep up with the steps in the process. We will show you how to retopologise and bake HD information on your low-poly mesh, and how to extract a clean Normal map to get a perfect base to start texturing. Finally, you will also learn how to build procedural PBR shaders and textures in Substance Designer, and work on your final pictures in Marmoset.

01


02

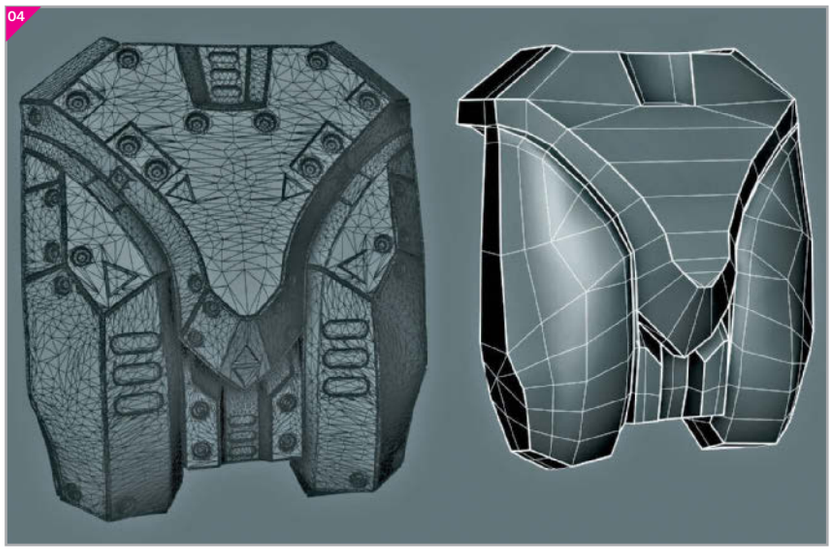

03

01 Export your high poly The first step is to export each part of your high-definition mesh from ZBrush. It is crucial to rename each part of your helmet to be able to organise your baking process properly. If you don't you risk confusion and you will, without a doubt, lose some precious time later on. Try to use explicit nomenclature for your parts, like 'Eye_left_HD', 'Head Sensors_HD' or 'JAW_LEFT_HD' and export this as an OBJ. This organisation will not change during the baking process, so spend as much time as necessary to find the clearest one. Once you have all your HD parts exported, decimate all your SubTools in ZBrush by using Decimation Master. Try to have a good balance between the shape definition and the polycount to be able to import your model in Maya. Then export each part again, keeping the same nomenclature, but this time with the suffix '_DECIMATED'.

02 Make the low poly In Maya, import all your decimated elements and use them as a guide to make your low-poly mesh. We usually use the Quad Draw tool to retopologise the elements, but you can also use a third-party program like 3D-Coat – whatever you're more familiar with. Before you start modelling, analyse each element to identify what can be baked together and what needs to be separated. Start your retopology and follow the decimated mesh as closely as possible. Stay homogenous in your edge flow and keep the same amount of polygons everywhere to have consistency in your global shape.

03 UVs, seams and Normals Once you are satisfied with your retopology, you can start unwrapping your mesh. For example, you can use Roadkill Pro to unfold the low poly. To increase the definition, you can also unwrap your model with multiple UV sets. In our case, we used two UV sets for the helmet and one for the decals. To have less distortion and a perfect result while baking hard surfaces, you need to cut your UVs whenever an angle changes to more than 45 degrees. Regarding your Normals, it's essential to have a hard edge whenever you have a UV seam. The rest of your Normals have to be smoothed, as if this is not done you'll get artefacts and issues while baking your Normal map.

04



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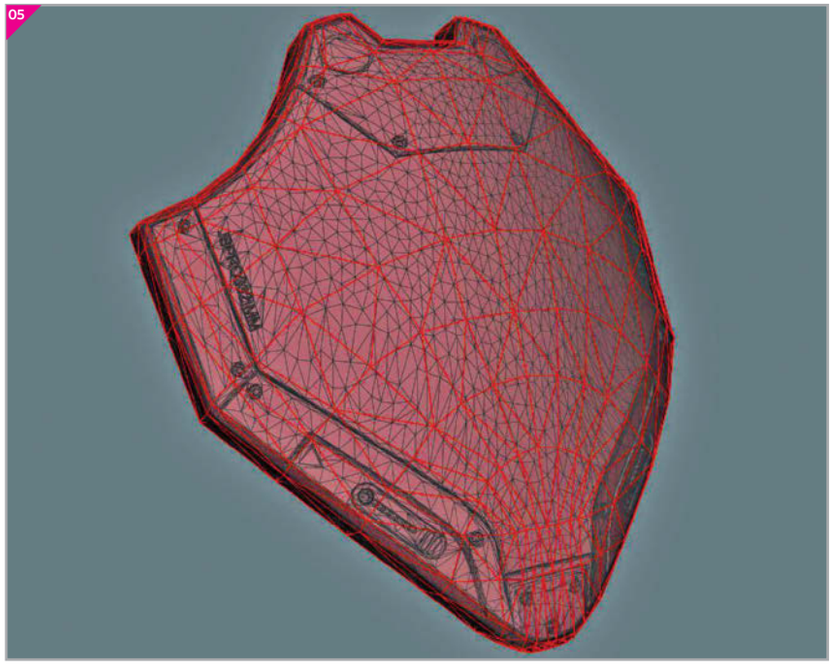

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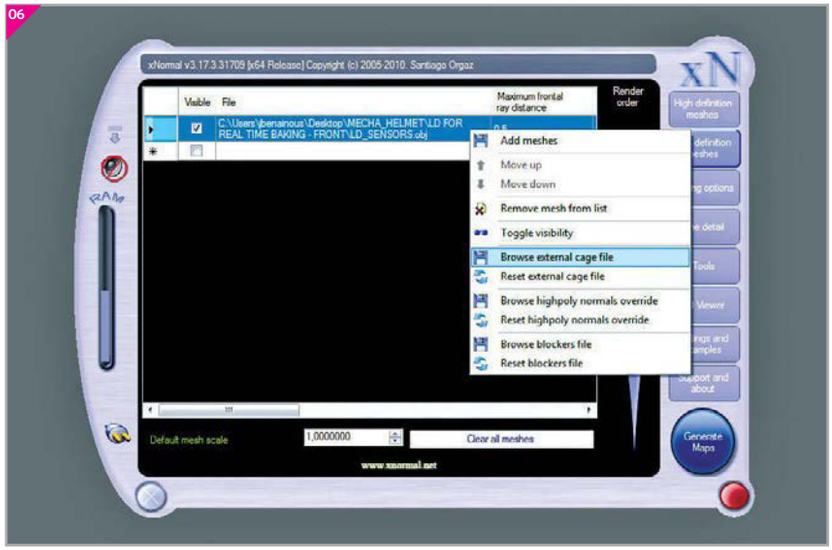


04 Choose your baking process Before exporting your low-poly mesh, start defining the way that you are going to bake your model. You can choose to bake every single piece separately, to merge a group of pieces together, or you can simply bake by UV set and IDs. The technique that you're going to choose is entirely linked to the program that you're going to use. If you decide that you want to bake your model in one shot, we would recommend that you bake it with Substance Designer or Painter and to use the 'Match By Mesh Name' feature to avoid any overlapping from occurring. If you use XNormal you can create a different merged group composed from spaced pieces, and you can then bake your group one after another. Whatever your chosen method, organisation is key for this step.

05 Projection cage Let's now take a look at the second baking method with XNormal. In Maya, duplicate each low-poly piece and rename it by utilising the suffix '_CAGE'. The cage is going to be used by XNormal to project the details from the high-poly mesh to your low-poly mesh. Everything included between the border of your cage and your low poly is going to be projected during the baking process, so you will need to prevent any crossing between your cage and the decimated mesh. To help with this, utilise a material with transparency so that you are able to see through it. Keep in mind that a cage needs to have the exact same amount of vertices as the low-poly mesh. If you need more definition to overlay your decimated mesh, you'll need to modify your low poly and then also duplicate it again to maintain the number of vertices. If you don't do this, XNormal will display an error message when you attempt to bake any map.

06 Bake with XNormal Now that you have all your cages done, export each mesh separately by following the previous nomenclature. Then, to prepare your baking process, group pieces that are far away from each other for when they need to be baked together in XNormal. Use layers with different colours in Maya to easily organise yourself and create layers as the model requires – in our case we have six layers. In XNormal, load your high-definition meshes and your low-definition meshes corresponding to your first Maya layer. To add your cage right-click on the selected LD mesh, select 'Browse external cage file' and do this for each LD mesh. In the baking options menu choose where you want to save your output files; set the size of your map, the edge padding and the bucket size; then click on Generate Maps. Repeat this process for all of your layers.

Add decals for more detail

To add more detail to your helmet, you can add little stickers here and there. This will definitely give a feeling of realism. To keep good definition, make a new mesh with a dedicated UV set. The easiest way is to probably create your sticker board first. To have stickers that match perfectly with the surface of your mesh duplicate some faces, push them a bit and then apply your new sticker material. Adjust the UVs using planar mapping. For final touches add stickers, a real background, scratches, dirt and use an Alpha map to rip the borders of your sticker shapes in Substance Designer.

Working with skin variation in Substance Designer

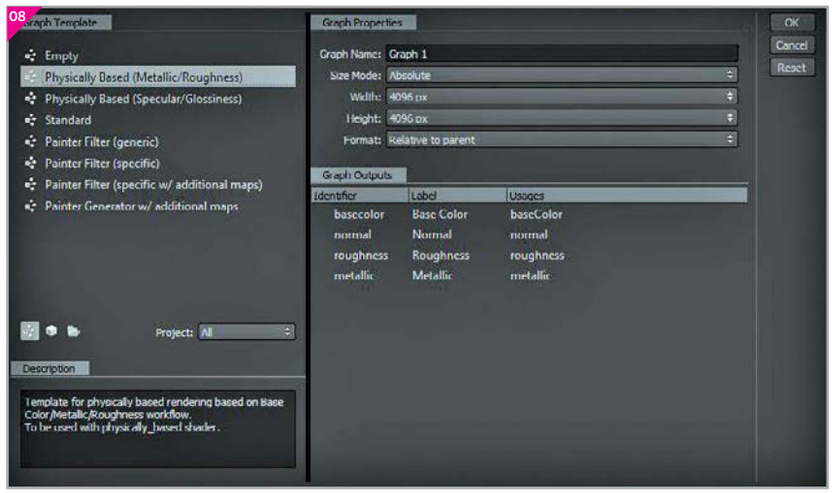
Substance Designer gives you the opportunity to exploit your work in many different ways, so don't hesitate to take advantage of this flexibility to reinterpret your own project. In our case you can see how: just by tweaking some masks, colours, materials and connection, we obtain three radically different results. You can see how Designer gives you total freedom of creation. Note that these renders were done by using the exact same mesh – only the materials are different and are procedurally done in Substance Designer.

07 Recompose Normal maps Before texturing your model in Substance Designer, start by recomposing your Normals in Photoshop. For each UV set create a new document with the same image size, in our case 4096 x 4096, and load each Normal map baked in XNormal as a Photoshop layer. Move one of them over to the other, use the Magic Wand to select the neutral Normal map colour and then delete it. Do this for each baked Normal map. Now that you have your Normal map, go back to Maya and merge your pieces together to have one mesh by UV set. In our case, this was two meshes for the helmet and one for the decals. Assign three different materials by mesh, and export your helmet as one single FBX file. This will help you later when you need to assign your shaders by UV set in Substance Designer.

08 Introduction to Substance Designer Open Substance Designer and create a new Substance. In Graph Properties choose 'Physically Based (Metallic/Roughness)' for the Graph Template, Relative To Parent for the Format, and 4096 x 4096 for the Width and Height. Let's duplicate the graphs and rename the two as Graph 1 and a Graph 2 (one for each UV set). Once you have created your graphs, right-click on your new Substance and then click on Link>3D Mesh to load your helmet. Then do the same but click on bitmap this time to load your two Normal maps. Substance will automatically create a folder called Resources for you to store all of your elements. Double-click on your mesh to load it in Substance Viewer, and in Graph 1 right-click and choose 'View outputs in 3D view' to apply your outputs on your 3D model. Do the same now for Graph 2. In each graph connect a Uniform Color node to your base colour, connect another one to your Roughness and one more to your Metallic. Then tweak the values to get a nice result.

09 Bake in Substance Now that you have your low-poly mesh and your Normal maps, let's see how you can easily extract new, very useful maps. In your Resources folder right-click on your mesh and choose 'Bake model information'. A new window will show up called Scene Information Baking. In the Bakers you can choose the maps that Substance is going to bake using your mesh and your Normal map's information. In our case we need to bake the Curvature, the Position, the World Space Normal and the Ambient Occlusion map. Once you have entered all the required parameters, click on Ok at the bottom right of the window to start baking. All your maps will appear in the Resources folder once they have been baked.

08



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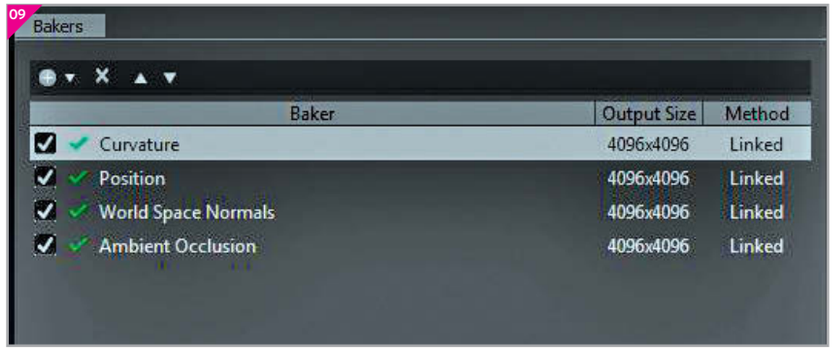

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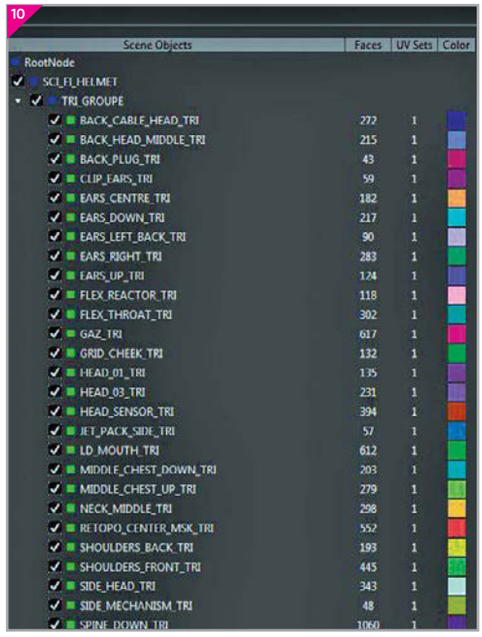
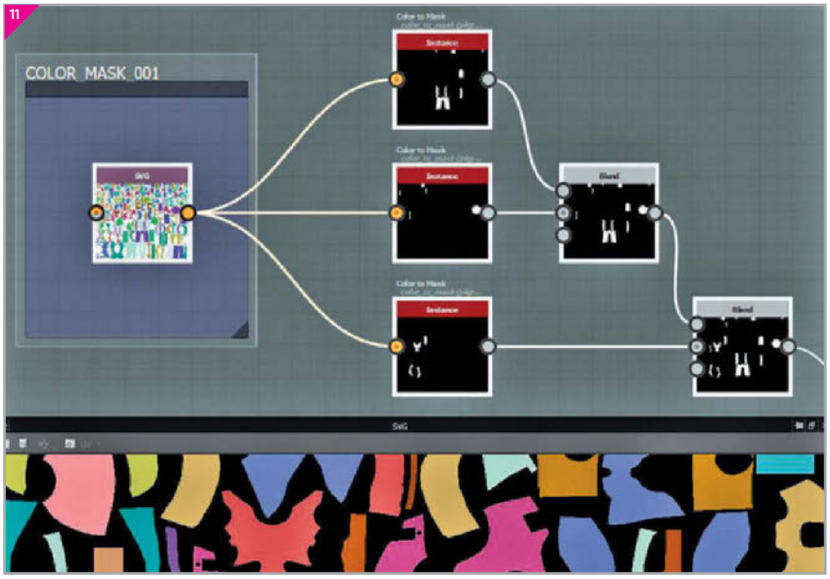


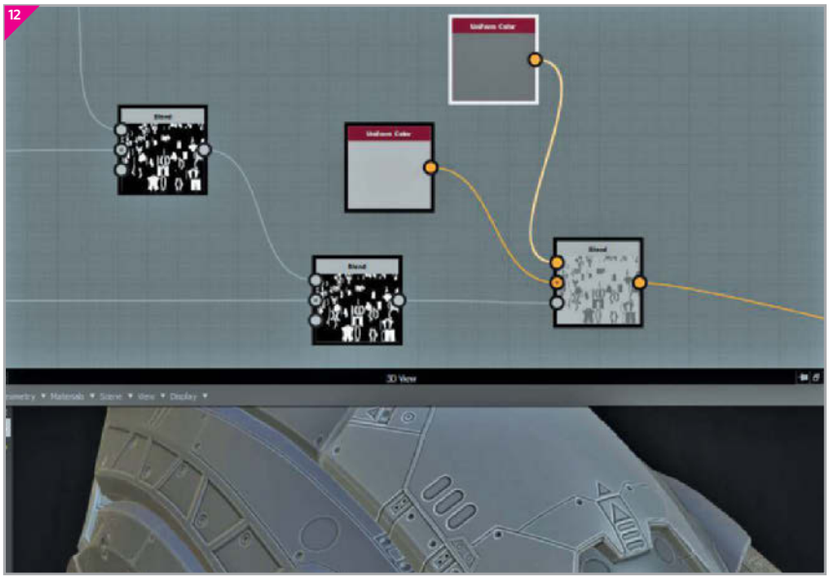
10 Colour mask One of the most important maps in our process is the colour mask. This mask will help you to pick and choose the elements in your UV set that you want to have the same material – this will give you total control in Substance Designer. To generate it easily, go back to Maya and assign a different material to each element of your helmet. Don't forget to export, once again, one mesh by UV set. Return to Designer, and link these new meshes to your Substance file. Right-click on the first one and choose 'Bake model information'. We are now going to use this mesh to generate a new map in the baker called 'Convert UV to SVG'. In the Baker Parameters, choose Material ID Color and for the Output Size choose 4096 x 4096 then click on Ok. Repeat the process with the other mesh.

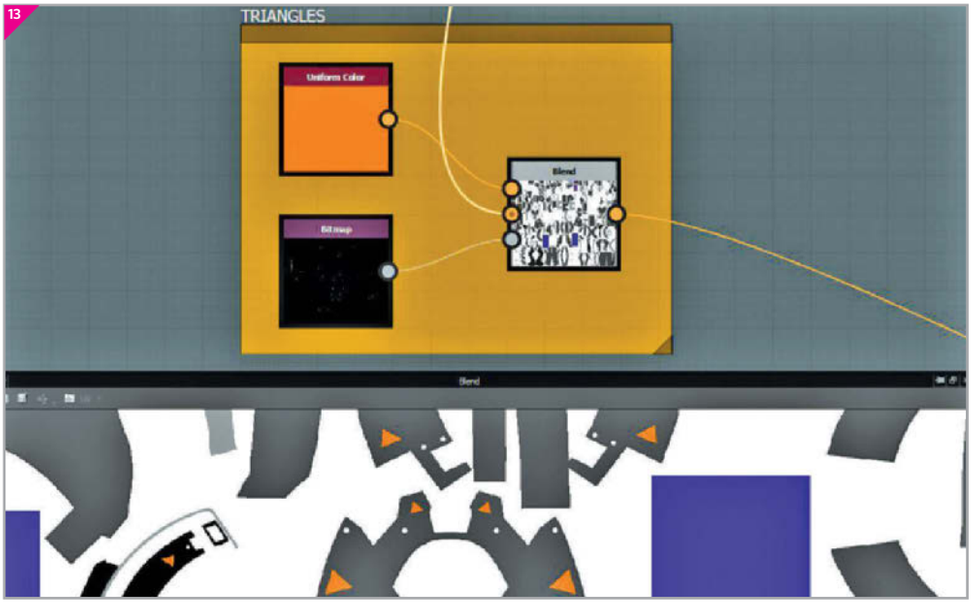
11 From colour to mask To start your first pass of detail in Substance Designer, learn how to use the colour mask to assign different Uniform Color to your pieces. This will help you to visually separate your elements, and organise your tree structure before replacing these colours with real PBR materials. In your Graph 1 drop your colour mask, add a node named Color to Mask and connect them together. Then, create a black-and-white mask corresponding to the selected colour, double-click on your colour mask and it will appear in your 2D view. Now do a simple left-click on the Color to Mask node to display the Instance Parameters. Click on Pick and choose in your 2D View the colour that you want to convert as a greyscale mask. Use the same method for all the elements on which you want to have the same colour, and blend these masks together.

12 Design the tree structure Once you have your final mask, create a blend and two different Uniform Color nodes. Connect your mask with Opacity, the first Uniform Color in the foreground and the second one in the background. If you keep your blend parameters by default, you should see your blend tainted with the colour of the two Uniform Color nodes. The white will get the colour of the foreground and the back the colour of the background. Repeat this process using blend nodes to isolate other parts and mix together a new greyscale mask with new colours. Keep in mind that your tree must be designed layer after layer. For example, the metal is under the paint, but a sticker will be on top of the paint and so on.

13 Customise masks for extra details Now that you have your tree structure with your masks, add some extra detail by creating new masks in Photoshop. Open your Normal map and observe the elements that you would like to isolate: this can be a plate, a shape, a stripe, a bolt and so on. Once you know which type of element you want to isolate, create a new layer and use the polygonal Lasso tool to draw your shapes. Use the Normal map as a guide and fill the selection on the new layer with pure white. Create a new layer underneath the previous one and fill it with pure black, then merge down your two layers. You now have a new detail mask that you can integrate in Designer. Operate the same way for any extra detail masks.



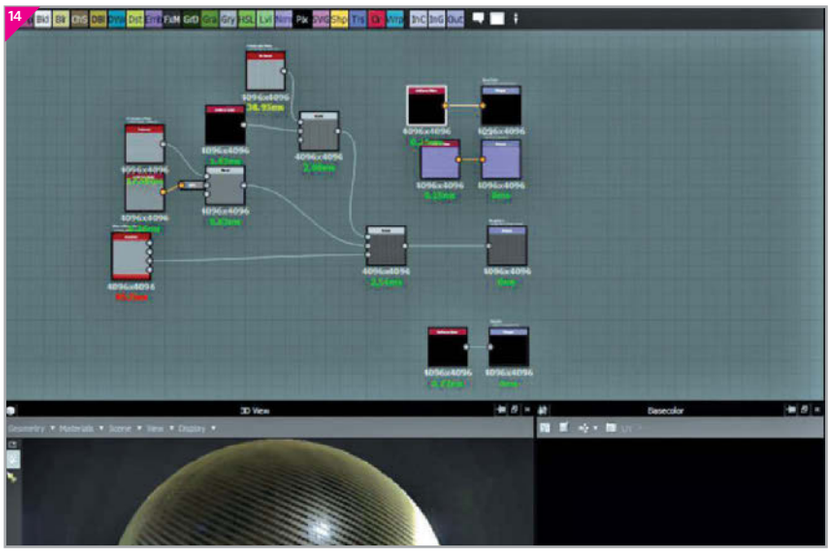


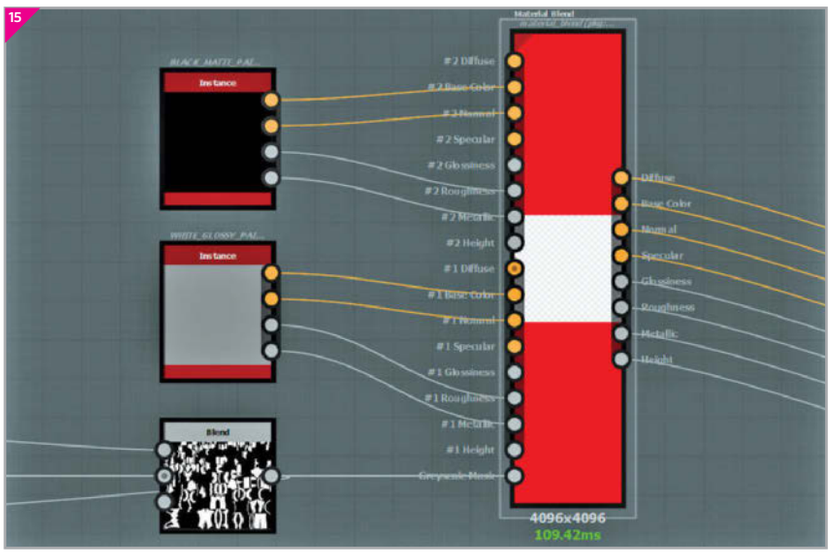


Physically based shader

Making a shader may seem discouraging when you start, but learning to understand how materials react in real life will help you acquire this knowledge. Studying in detail the composition of different metals can be a good starting point. For example, learn how some metals become corroded when they come into contact with air or water. Iron and steel will be oxidised by rust and will corrode slowly if they are not galvanised; copper and bronze will be covered by verdigris and hermetically sealed and so on. These chemical reactions will help provide background to your materials and help the audience to understand the story behind your asset.

14 Create your own material Start by finding the type of material you would like to have on your helmet. Note that we truly recommend that you search for references before you start this step. Having photo-based references will definitely help you in your creation process of PBR materials. Once you've listed the required material, create a new graph and start by finding the different node that you can use to create one of your materials. Let's take the carbon fibre as an example. The key in Substance Designer is to try to stay really simple in the construction of your shader. Add Uniform Color first to find a good balance between Metallic and Roughness. Then go more in depth by adding more and more detail. For the carbon fibre you also need to reproduce the checker pattern that you have on this type of material. We used a node called 'weave generator' to generate the pattern, this generator is going to be used as a mask. Then for the fibre detail we have blended together a Uniform Color node and an Anisotropic Noise node: one with dark grey and one with light grey. By using the checker as a mask and connecting the result in the Roughness you obtain a basic carbon fibre effect very easily. By tweaking the different values you can have a glossy or matte effect.





15 Use Multi Material Blend Once you've created all your different materials, rename them clearly. We are now going to replace the Uniform Color node present in our main Graph 1 and Graph 2 with our new PBR materials. To import one of your materials as an Instance node, you can directly drag and drop it in your main graph. Keeping the same tree structure, blend your materials together using a node called Multi Material Blend. This is a really useful node as it will enable you to blend together the base colour, the Normal map, the Roughness and the Metallic. Note that you can easily switch the 'Link creation' mode by using the 1, 2 and 3 keys. To keep your details, don't forget to reconnect the mask that you had on your previous blend.

Showcase

Jonathan Benaïnous

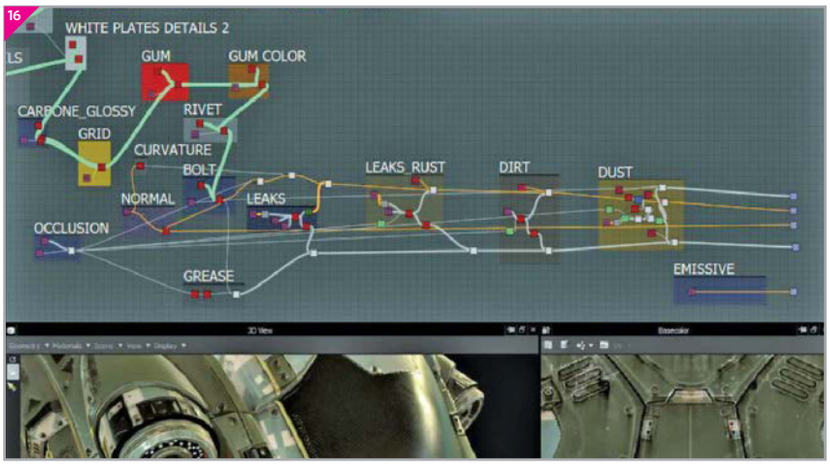
Jonathan started in the videogame industry ten years ago as a 3D artist and environment artist. He has a passion for creating a wide range of images, vehicles, environments and lighting. He also particularly appreciates all high-tech and hard-surface work.

Condenser Room / Beyond : Two Souls
Maya, Photoshop (2014)
For *Beyond: Two Souls* Jonathan was in charge of the modelling, the texturing and the lighting for this huge room.

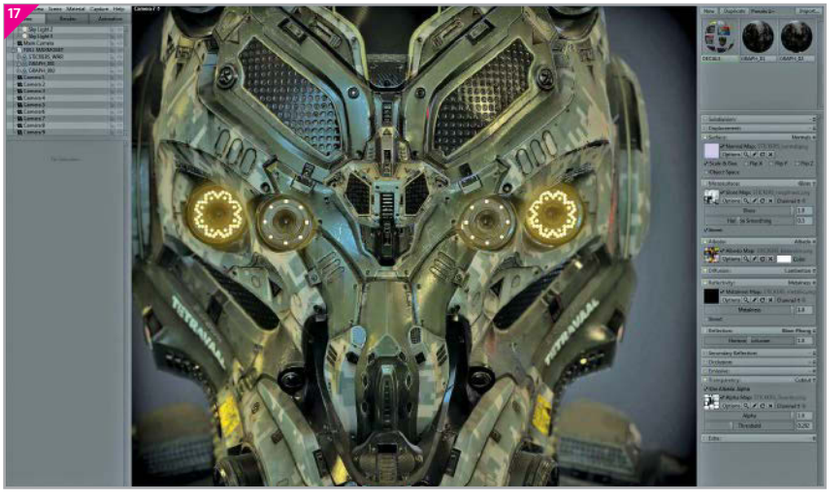
Buildings / Horizon : Zero Dawn
Maya,Photoshop (2015)
For *Horizon Zero Dawn* Jonathan worked on the conception of post-apocalyptic cities.

World Building - Rocks / Ghost Recon: Wildlands
ZBrush, Maya, Substance Designer (2016)
For *Tom Clancy's Ghost Recon: Wildlands* he worked on the realisation of realistic real-time rocks.

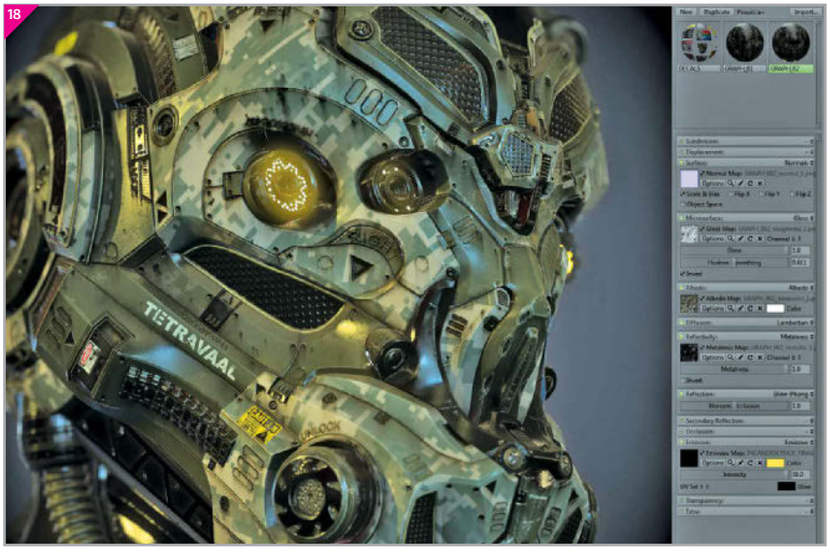
16 Add dirt and damage Now that you have your helmet textured with your materials it's time to add dirt and damage to give a worn style to your asset. You need to think about the level of dirt you want to have and to visualise it as a stack of layers. The scratches on the paint will come first, then the grease, the oil/rust leaks, the dirt, the dust, and so on. To generate these effects, go to the mask generator folder and play with the different nodes. You can also create your own mask by tweaking your Curvature, AO and Position map. It's really important to keep a very well-organised tree structure, and to work on one effect after another. To simplify your main graphs and to locate your effects you can also directly integrate some of the damage in your materials, like scratches, rust and so on.



17 Bring to Marmoset Toolbag 2 In Substance Designer, export your output maps by clicking on the tools icon above the graph window. Go back to Maya, and merge the different pieces of your helmet by UV set. In the end you should have three meshes: one for Graph 1, one for Graph 2 and one for the decals. After that, export your meshes as one single FBX. In Marmoset import your mesh by using Cmd/Ctrl+B. If you click on it in the scene outliner you should see the different meshes from your FBX file. To be able to visualise your materials from Substance Designer, you need to load each map in the corresponding tab of your shader. Load the Normal map in the Surface tab, the Roughness in the Microsurface tab, the Base Color in the Albedo tab, the Metallic in the Reflectivity tab (be sure to set up the proper input type and change 'reflectivity by metalness') and the Emissive in the Emissive tab. Then display your materials in the 3D viewport and drag and drop each shader on your mesh parts. Don't forget to change the Reflection mode to GGX Shading to get a more realistic look on your rough surfaces.



18 Render with Marmoset To prepare your final render let's first see how to improve your 3D view. First, choose the landscape that you will use to light your model. Click on Scene and choose one of the HDR maps that appears in the list. If you want more light sources click on Sky, then click directly in the Light Editor to add new lights. You can set up the intensity, the colour and so on. In the Render tab, you can tick the Ambient Occlusion and adjust the strength and the size. In the Scene tab, click on Camera and adjust the field of view in the lens section. Then set the depth of field in the Focus section to fix the amount of blur you want in your render. It's really important to spend time adjusting the sliders to obtain a perfect result. To add some chromatic aberration, play with the sliders in the Distortion tab. In the Post Effect section, adjust the exposure, the bloom and also the vignette sliders to get the wanted result. Now that you've set up your camera, you can calculate your final render. Go to Capture>Settings and a new window will now show up. Set the image size, the sampling and the format, then click on Ok. Note that by default, the picture will be saved onto your desktop.



Marmoset Viewer export

As you probably know, Marmoset Toolbag 2 enables you to export a real-time viewer to showcase your work online. If you go to File>Viewer Export you can easily export a standalone version of your 3D viewport and upload it to your website. The texture quality field will allow you to set the level of compression of your maps. If you tick the Lossless Normals box, the exporter will preserve your Normal map quality but will give you a bigger file in the end. Websites like ArtStation already offer a system to directly upload and stream your viewer online. It's a really handy way of quickly sharing your work with the community.

"The fastest and easiest way to texture"
- Simon Fox, Blizzard

"Holy shit this is bad ass"
- David Lesperance, Valve

"An essential part of my pipeline"
- Josh Marlow, Epic

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thomasdeffet.com

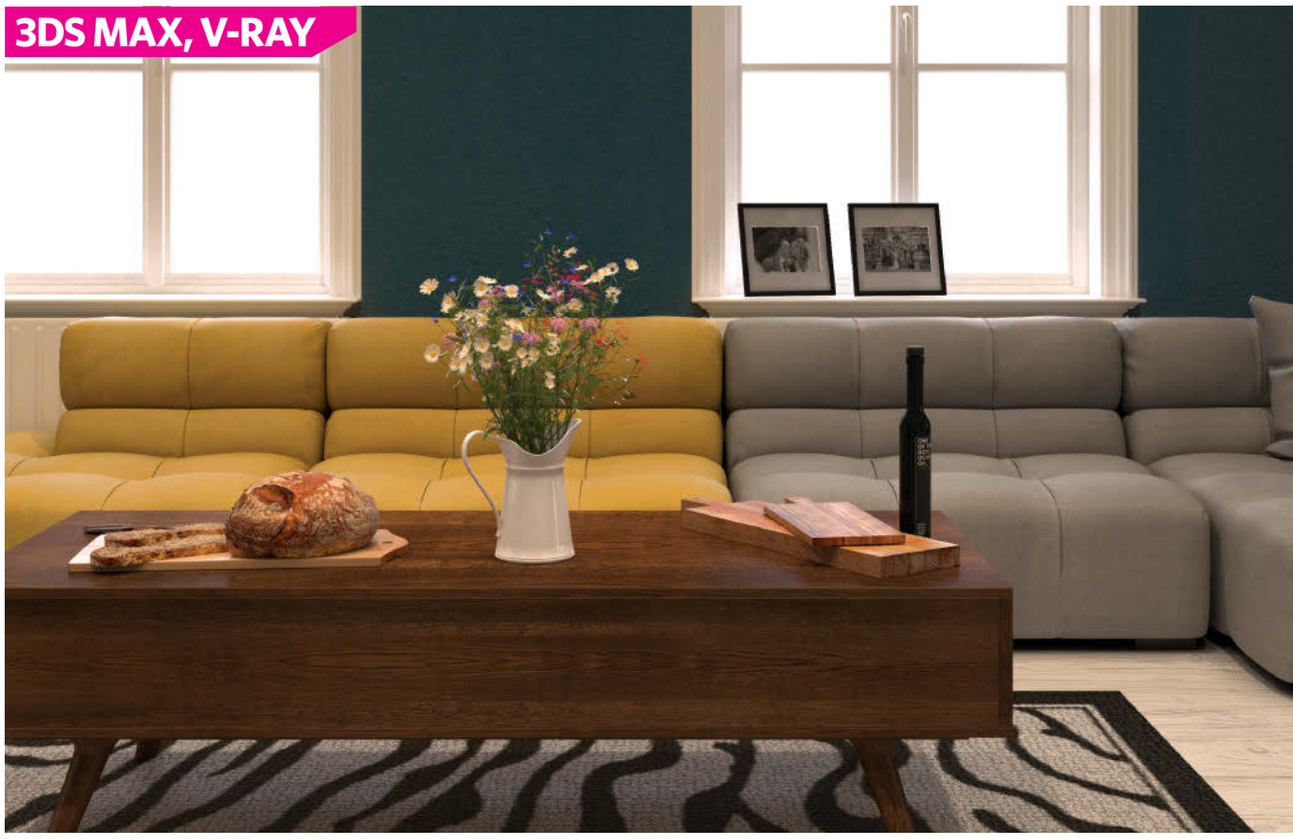
Specialising in arch-vis, Thomas is a 3D artist who always tries to learn new tools and workflows

Maya

Jahirul Amin
jahirulamin.com

Jahirul is a 3D trainer at Double Negative. He has a passion for observing and dissecting the real world

3DS MAX, V-RAY



Master V-Ray lighting

Offering 3D artists an incredible arsenal of tools, V-Ray enables scenes to be lit in both photorealistic and non-photorealistic ways. One of the most beautiful things about V-Ray is that it has kept its tools and workflows broad enough to encapsulate artists that need to accomplish a wide variety of tasks. This is something that's especially helpful for smaller studios, where the client may require a whole host of different deliverables.

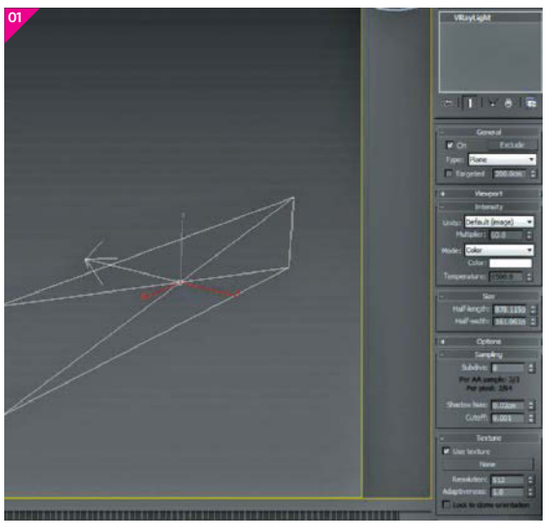
In this tutorial we'll be giving an overview of all the lighting tools that V-Ray provides. We'll try to provide practical applications for each light to help you see how you can integrate them into your current workflows. We'll also detail some of the parameters and what they do. By the very nature of the length of this tutorial we won't be able to go into complete detail about each light, but hopefully you'll get a broader overview of what V-Ray gives you.

These tools are split into actual lights, materials and maps, whereby each type achieves its purpose in a different way. In the actual light category we have the light, the Sun, the IES, the Ambient and the Sphere. The lights can be found either on the V-Ray 3 toolbar or the V-Ray dropdown in the Create panel. You can also access them by hitting X to bring up the search box and typing 'Create light'.

In the materials category we have the light material, and finally in the maps category we have the HDRI and the Softbox. Both the materials and the maps can be found in the Material Editor using either the compact or the slate version.

That's enough of an overview and so, without further ado, let's get cracking on with the actual tools.

01 VRayLight overview VRayLight can be set to five different types and this includes the Plane, Dome, Sphere, Mesh and Disc. The Disc type will be discussed in the next step and the Dome type will be mentioned in the step about HDR maps. The Plane light type creates a simple rectangular light, where the light is spread out equally in all directions. There is a rollout, which lets you narrow the light direction. The Sphere type casts light in all directions and the Mesh light enables you to turn an object into a light source. This is particularly helpful for light fittings.



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02 Plane lights with VRayLight Disc

This is a specific type of VRayLight, which is the same as a Plane light but in a disc shape. This is particularly helpful for light fittings that are circular in shape. You have access to the same parameters as the Plane light, including the ability to narrow its directional effect. Note that each light type still has the rollouts visible for the other light types, but they are greyed out. If you set the light to be visible then it can also act as the visible light emitting part of your light fitting.

03 Sky and lighting with VRaySun

This light is designed to work with VRaySky. If you create VRaySun then it'll prompt you to then create VRaySky, which is extremely helpful. Both the Sun and the Sky change depending on the Sun's direction. If you want softer shadows then you can increase the size multiplier. Try to leave the Sun multiplier at 1 for a physically accurate result, although you can reduce it if you want to use it in conjunction with an HDRI map for example. If the Sun is set to visible and is located in the camera's field of view then you will see the Sun represented in the Sky.

02

Direct versus indirect light

It's helpful to be aware that V-Ray provides two main types of implementations of lights. There are the lights that work like direct lights and affect the primary rays such as the main VRayLight and the Sun. Then there are lights that only affect the secondary rays and are visible in the GI render element, such as the V-Ray Light Material. Despite this categorisation V-Ray does still enable you to turn these secondary ray lights into direct illumination. For example, the VRayLightMtl has a checkbox which turns it into direct illumination. This knowledge is vital when troubleshooting lighting problems in the render elements.

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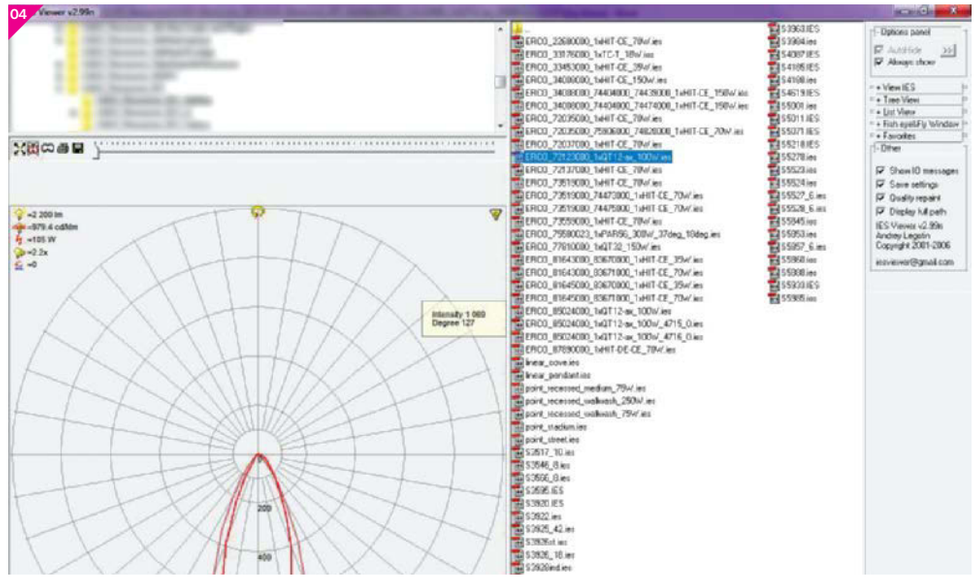


05

04 Use the V-Ray IES viewer

This light lets you load and render real-world light distribution profile files called Illuminating Engineering Society files, or IES for short. This file contains all the data required for V-Ray to re-create the distribution of a real light. You can download IES files from most major lighting manufacturers, and they really help to bring life and realism to your projects. Chaos Group provides an IES viewer in the tools folder, which can be used to view the light distribution of specific IES files. Use this to find the perfect IES file for your scene.

05 Non-directional lighting with V-Ray Ambient Light

This light is non-directional, meaning that it casts light from all directions. It can therefore be used to simulate GI or ambient occlusion. You could also use it to boost the overall lighting in your scene. In its properties you can specify what the ambient light contributes to. It can either be used purely as a direct light, which only affects the direct rays, or as a light that only affects the secondary GI rays. Alternatively it can be used for both primary and secondary rays.

06 Use materials for VRayLight

Now that we've looked at the actual lights, let's move on to the only material that acts as a light. This material is generally used for producing self-illuminated surfaces, and enables you to turn an object into an actual mesh light source. Note that this is calculated in the GI element. If you want to achieve the same effect using direct illumination then you can do it by checking the direct illumination. We would generally recommend avoiding this light material, as it can easily cause problems in the global illumination solution. Similar results can be achieved with things like the Mesh light type or the Disc light type.

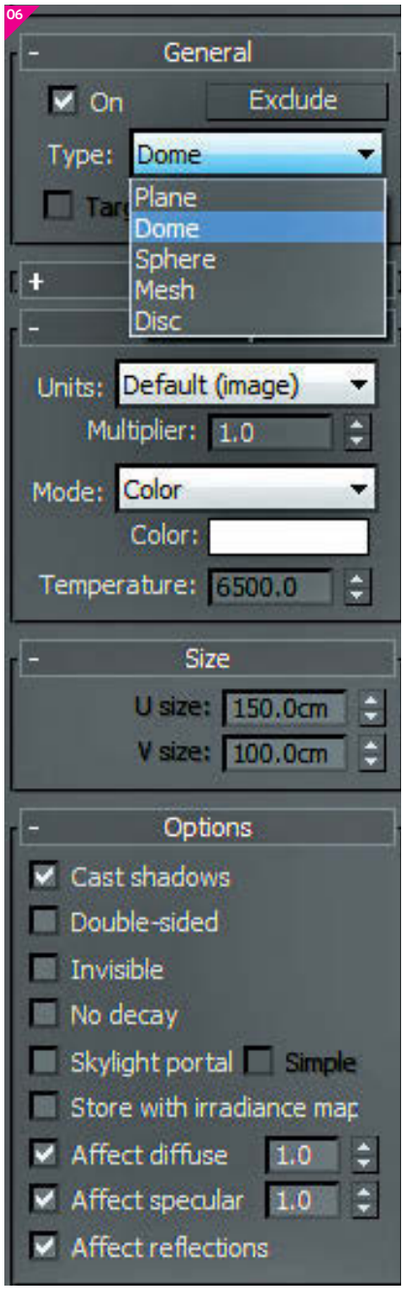
07 Light maps with V-Ray HDRI

This map can be used to load in maps that have a high-dynamic range, such as HDR files or EXR files for example. The beauty of these files is that they can be used to re-create real-world lighting scenarios, both exterior and interior. The VRaySun and VRaySky will produce a very uniform look and feel, especially in reflections. A HDR file, in comparison, produces a much greater variety of Illumination and reflection data to be taken advantage of. Load this map (Set to spherical mapping type) into the texture slot of a V-Ray Dome light and you'll be well away!

08 Soft illumination using VRaySoftbox

This map texture can be slotted into a V-Ray area light to create the illumination coming from a softbox light. Essentially this gives you much greater control over how your light objects cast direct light and thereby giving you a more customised feel. In essence the light has a base colour and controls to customise either the hot spot or the dark spot. This spot can be given a separate multiplier, and can have its radius values and softness adjusted. Both the base and the spot have tint colours and strength to further customise the feel of the light.

06



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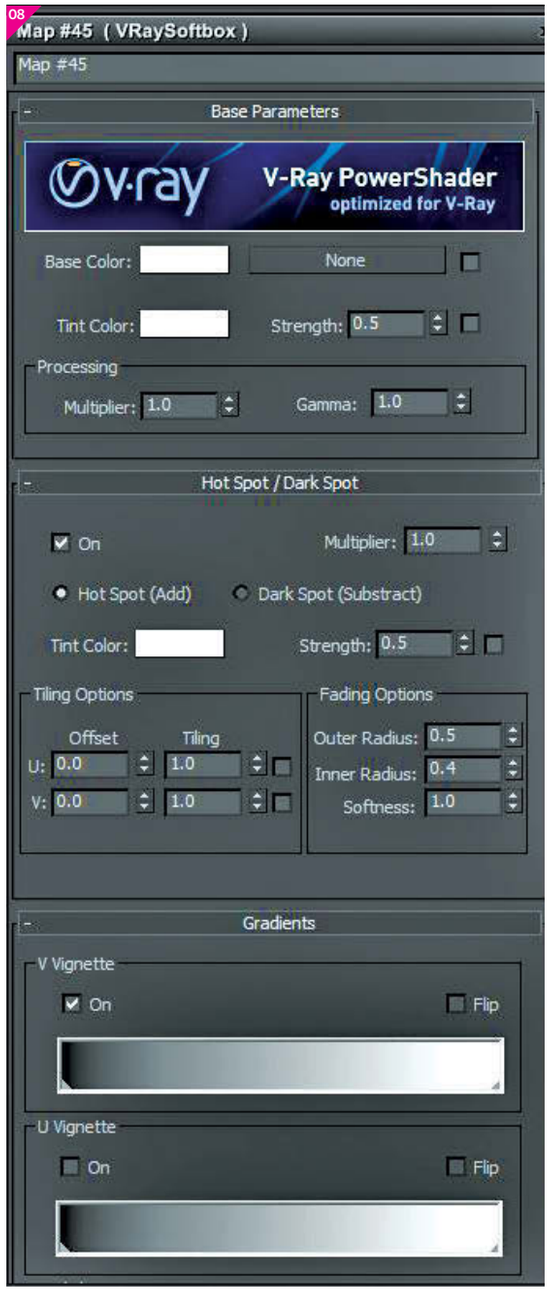

Don't be afraid to fake it

Ever since visualisation got off the ground there has been a healthy push towards creating scenes in realistic measurements with realistic lighting setups. This has all been in the pursuit of replicating a photographer. What has been forgotten is that photographers use tools to create the look they want, like setting up out-of-shot lighting to accentuate certain parts of a room. As artists we should be doing the same! Use light to your advantage.

07

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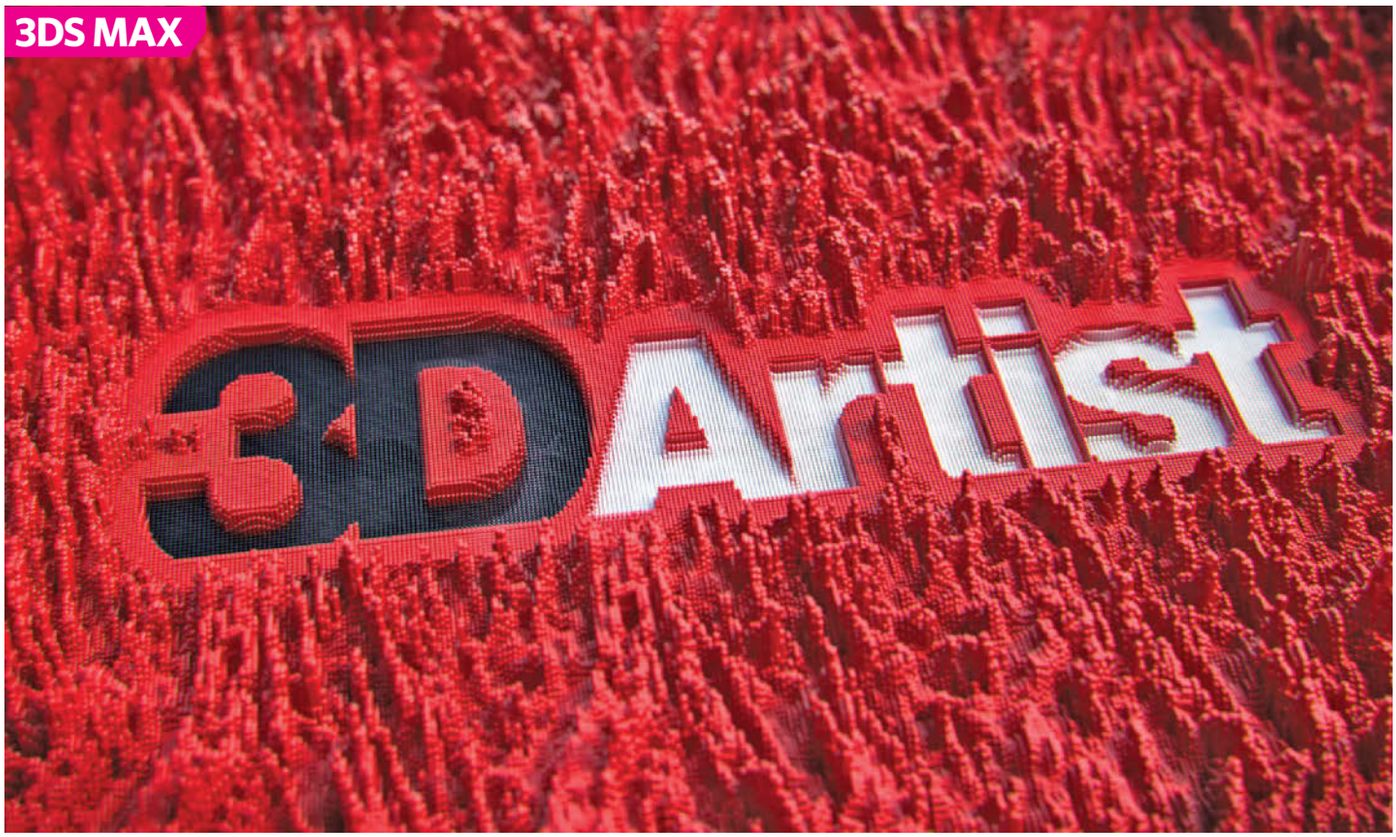


Create abstract art by configuring primitives

The amazing work of Lee Griggs is very inspirational. He created incredible abstracts using Maya and the XGen plugin for distributing geometry. As a 3ds Max user, you can test the limit of this approach with Forest Pack and in creating a series of colorful abstracts.

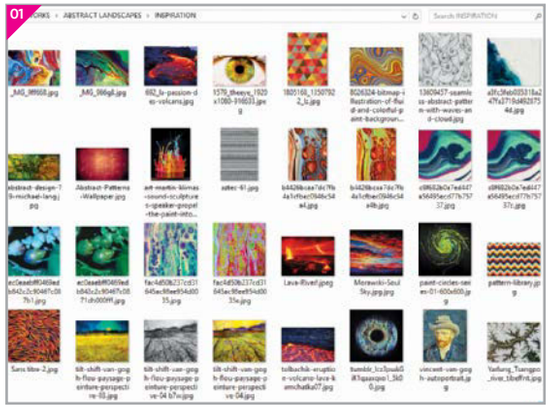
In this tutorial we are going to create an abstract landscape by controlling primitive objects with a texture map.

There are different methods and software that can create this kind of effect. You can create them by using Hair Particle in Blender, XGen in Maya as Lee Griggs did or Particle Flow in 3ds Max. You can also use 3ds Max and the plugin Forest Pack for the distribution of geometry, as Grant Warwick and Bertrand Benoit have done.

To create this effect, we will use 3ds Max and the Forest Pack plugin for geometry. You will only need a basic knowledge of the plugin and its parameters to create an amazing abstract. We will use V-Ray for the render and the HDRI of Peter Guthrie for the light. Finally, we'll use Photoshop for the colour correction and After Effects for depth of field.

In summary, we will only need to use one plane for the surface and only one primitive object (box, sphere, cylinder and chamfer box) for the geometry. For that, we will need to create two textures: one that will be in black and white for the scale and the rotation, and another texture to provide colour for the geometry.

01 Find an image First of all, we will need to find or create an image that we will use as a texture map in Forest Pack. This image will define the scale and the rotation of the primitive object that we will create, so it's an essential step. There are many artists using the internet to look for inspiration and it really is the best place for gathering up work, so do make sure you look online. For the abstracts themselves, we were inspired by different kind of images. Some of these were just patterns and others were of liquid painting, or a bird's eye view of a road or river for instance.



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02 Modify your image As a map, the image will be the most important part in creating the abstract image and providing an impressive effect for your landscape. One of your maps will need to be in black and white and will define the scale and the rotation, and the other map will define the colour of your landscape. We duplicated a part of a black-and-white image to get scale variations and ended up with this kind of extrusion.

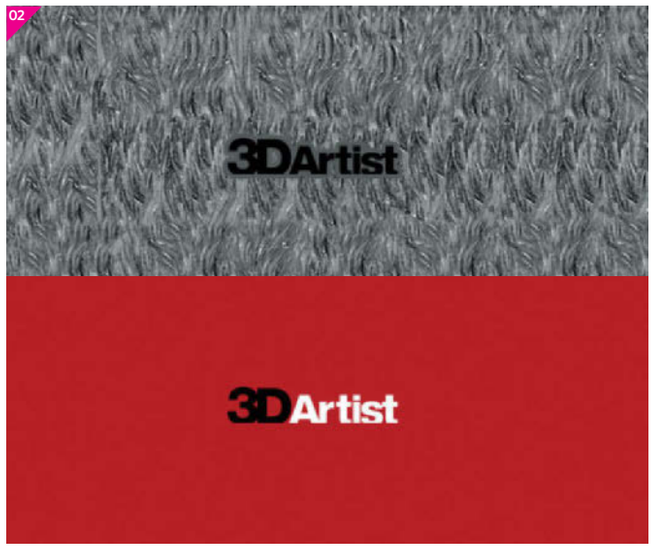
03 Create a primitive object In 3ds Max, create a plane for applying Forest Pack. In the Standard Primitives panel, create a plane with dimensions of 100 x 100 and centre it to 0 so it works properly. Then, create a primitive object to scatter. Different kinds of primitive objects, like a sphere or a cylinder, can be used. We used a chamfer box to get more curves and details, as the curve of the chamfer box is an important detail for lighting. Convert the chamfer box in Editable Poly, and delete the bottom edge to lighten the viewport and reduce rendering time.

04 Add Forest Pack Now that your plane is set up, add Forest Pack. In the Creation tab of 3ds Max, select Itoo Software, click on Forest Pro and click on your ground plane. In Geometry in the Forest Pack parameters, select Custom Object and then your primitive object. In Distribution Map, set the density units to 10cm. If you are not able to do this, then try to increase the density as you have probably reached the density limit of 3ds Max. In addition, change the image bitmap to full.bmp to scatter the primitive object to the ground plane in a uniform fashion.

05 Define a rotation texture map We are going to use the texture map in black and white to define how the primitive will look. In Transform, enable Rotation and set up the min and max axes to 0 except for the z axis, which is set to -359 and 359. Then, load the texture map to define the rotation of the primitive objects. To see the result of your image rotation on the viewport, check the map on the z axis. Now, the rotation is based on the image. To facilitate further changes, drag the map as an instance to your Material Editor as it provides easy access to any parameters on it.

06 Create the scale This is the most important step for the visuals. So, like in Step 5, enable Scale and drag the same black-and-white map from the Material Editor to the Map slot as an instance. Lock the aspect ratio on xy. Then define the parameters (min and max) of the x and z axes. Test different values for the min and max of the axes according to the primitive object dimensions, and play around with the parameters.

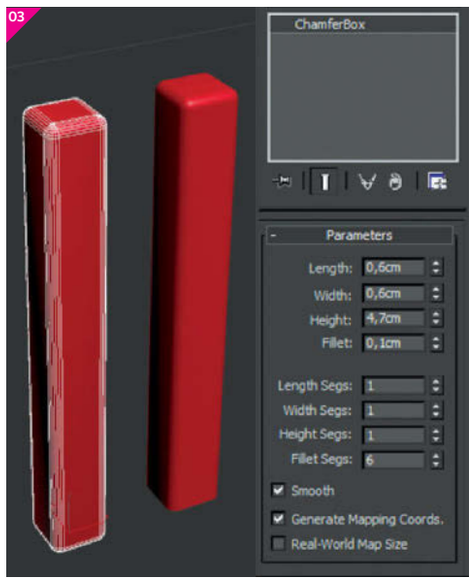
02



Different results

The result depends on different factors like the density, the scale and your image. Don't hesitate to play with parameters and add differents effects to your images eg water, fog, depth of field and so on. There are no limits to these techniques except the limit of max items that your hardware configuration can show in the viewport and render. You can set the max items in Forest Pack's display panel.

03



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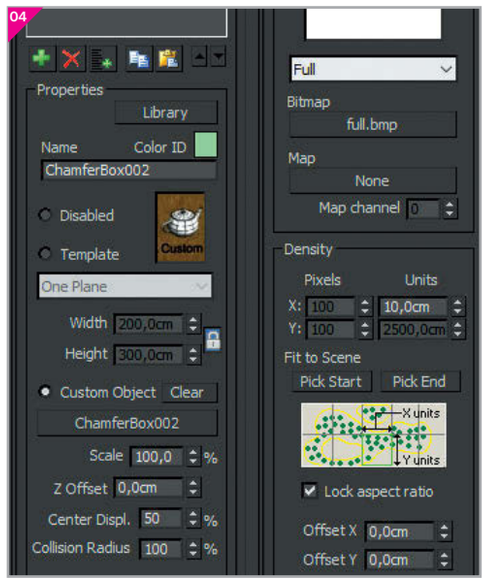

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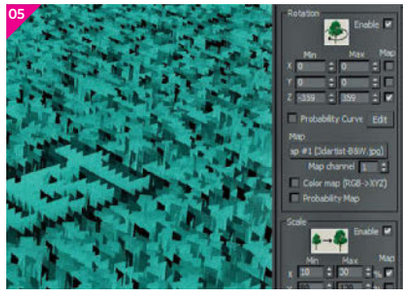
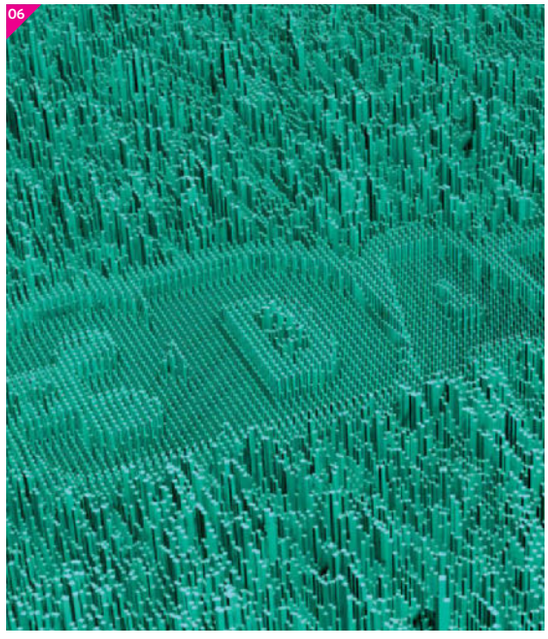


Curve edges of primitive object

To give more details to my landscape, I use a chamfer box to add curves and more details to the render. It gives a better result and not brittle edges. You will only see the effects of the curves at render time if a reflection is applied in the material process.

06

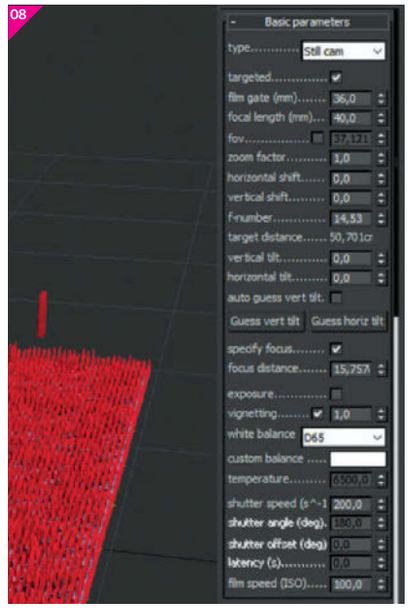


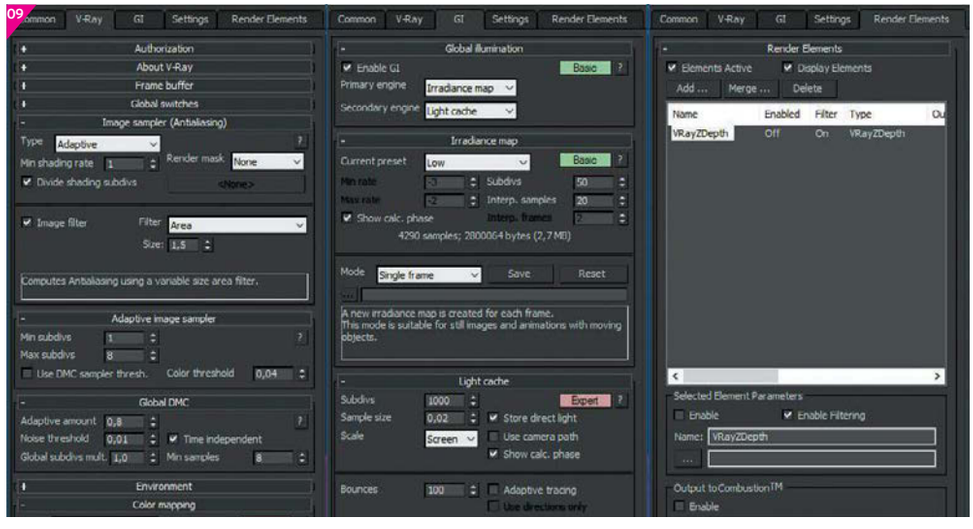
07 Set up the material Now that the extrusion is created, we need to add the colour. In order to do so, we are going to create a V-Ray material in the Material Editor and add the Forest Color map to the Diffuse slot. It is also important to add the reflection in order to highlight each primitive object. In the Tint tab click on Override and set your colour image to 'As texture on surface'. In the Blending mode, we will also need to choose the Normal option. When it's done, go back into Forest Pack, and in the panel geometry you will have to add your material as an instance to the Material slot. Now that we have created the scene, you will be able to see the landscape geometry if you render out an image.

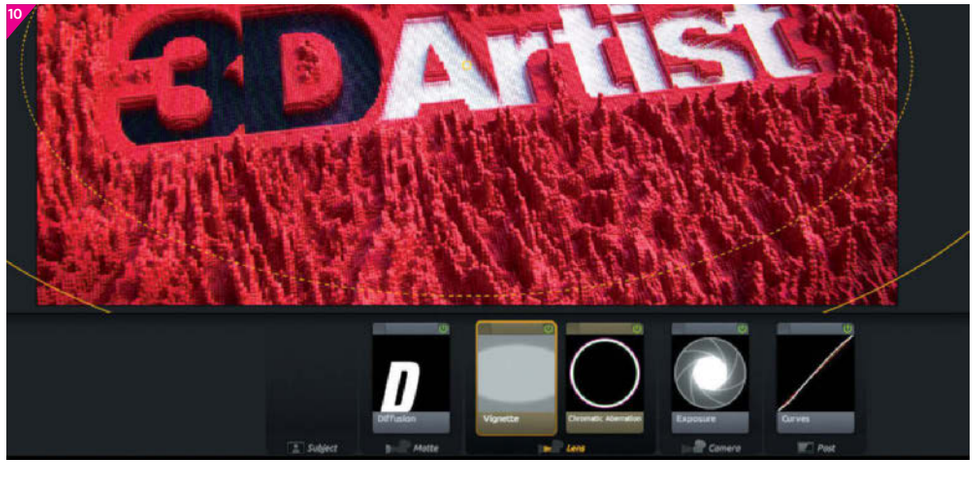
08 Set up lighting and camera It's time to set up the camera and the lighting. For the camera, we are going to create a V-Ray Physical Camera that we will place close enough to the primitive object in order to see the details. For the lighting, we used a V-Ray light to get a better result. The light is a V-Ray Dome, with a V-Ray HDRI and spherical mapping from Peter Guthrie. The choice and the parameters of your HDRI will define the light of your scene. We chose HDRI 1322 Slightly Hazy from Peter Guthrie's collection (pg-skies.net). Your scene is now ready and prepared for rendering.

09 Render settings For the render, use V-Ray with GI Enable and an irradiance map for the primary engine and the light cache for the secondary. For the depth of field, add a VRayZDepth pass as the render is fast so you will get more control in post-production. Configure the parameters of the VRayZDepth correctly with the V-Ray camera in order to get a good z-depth pass for post-production. In order to get a correct result, configure 3ds Max with Linear Workflow set to 2, 2, and set Color Mapping to Linear Multiply with Gamma set to 2, 2.

10 Post-production If you have configured your HDRI and your camera, your render at this stage will be really close to your final image. Use the plugin Magic Bullet Photolooks to correct the colour balance, then add some chromatic aberration and vignetting. We can easily achieve depth of field with After Effects and the Frischluft plugin. An easy way to do this is to use the final render and the VRayZDepth pass, then import them as a new composition. Add Frischluft to the final render and choose your depth-of-field pass render in the depth layer. With this, you can easily choose your point of focus and place it where you would like. Finally, select the point of focus, configure the radius in Parameters and export your composition.







Importance of scale

The scale of the primitive object is a really important factor during artwork creation. Do not hesitate to play with the parameters in order to get the result that you would like.

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MAYA

Animate a parkour sequence – part 1

The temptation in this kind of situation is to want to get into the piece and start moving your character. However, there is a fair amount of preparatory work to do beforehand, which will make your life much easier and your final piece far easier on the eye.

In the first part of this two-part tutorial, we will be doing all the prep work and completing the blocking phase of animating a parkour sequence. This will let us go ahead and focus on polishing off the animation in part two.

First, we'll be finding some reference and then analysing the footage in Kinovea (kinovea.org). From this, we'll then create a short animatic to help us to set the timing and the framing of the piece.

After that, we'll jump into Maya and set our cameras and start blocking in the key poses. We'll then add the contact poses and then the breakdowns. Finally, we will refine the cameras, the framing and the overall timing. When looking at parkour reference, the cameras almost seem like a character in themselves, so we'll want to replicate some of those characteristics in our work.

For this tutorial, we've included a rig (boxBoyRig_PUBLISHED.ma) and knocked up a small environment. Feel free to use your own character rigs, though, and your own environment. You can also move the buildings in the environment around to create your own layout. Also, if you are interested in creating a larger city environment for final renders, then make sure you take a look at using the free script QTown (braverabbit.de/playground/?p=464) by Brave Rabbit. It's a little gem.

01 Find some good reference The first thing to do is grab as much reference as possible. The internet is obviously a great place for this but it's also worth investigating your local area for any parkour artists. Pop to your local gymnastics centre and see how gymnasts move – perhaps even have a go at some simple moves yourself to get a real feel for what happens to your body. The primary reference for this

01
Lifting arms, and chest in coordination for jump
*Notice arms are positioned out to the sides during jump for balance
Forward Momentum
Step 2
The Take Off
*Wind up arms and legs to throw up into the flip

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tutorial was a combination of what was our, thankfully, unwitnessed attempts at parkour, and the invaluable Tapp brothers (learnmoreparkour.com). There's some amazing visual footage on the site, and there is also an in-depth breakdown of most of the moves, which will really help when laying down the poses. We can't go any further without saluting the original and best (in our eyes) though: the man Jackie Chan, from whose moves so much can be learnt.

02 Select some key moves Once you've accumulated all your references, you should narrow it down to a set of moves that interest you most; don't go overboard with the number of moves you'd like to animate and try to think about how one move will run into the next. The ones we have decided to go for are: the backflip to roll, the precision jump, the dash vault and the sideflip. We recommend that rather than copy the moves you're aiming to animate, you should go for something different while keeping the principles and theories behind the animation – we'll be outlining these below.

03 Break down the reference in Kinovea When you are happy with your list of moves that you'd like to animate and your supporting reference, we suggest you take the footage or the reference images into a package like Kinovea and then break the movement down. Start by thinking about the key poses as these will be the initial poses we lay down in Maya, and then the contact and breakdown poses. You can also export the drawovers out from Kinovea, take them into Premiere Pro and then export them out as a JPEG sequence in order to view them in Maya on image planes.

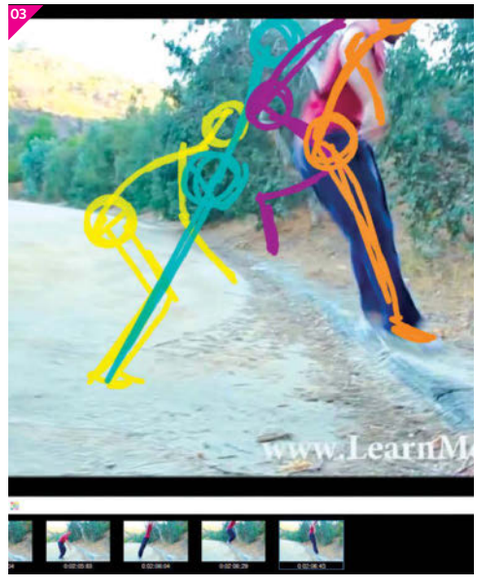
04 Create an animatic Once you've gathered your reference and broken the moves down, create a little animatic to give yourself a good idea of the timing and framing. For this animatic, we actually created some low-res geometry in Maya for the environment, hit Print Screen (or Cmd+Shift+3) and then worked over the images in Photoshop using the references we had gathered online. The drawings were then taken into Premiere Pro and edited together to create a rough cut. If you are not in the mood to create some drawovers, why not cut up the video reference you have directly in Premiere Pro to see what sequences you can come up with? For this animation, we decided that we wanted it to play in a loop, with the character starting and ending in the same position. To make this work, we arranged the buildings in a manner that enabled him to run round in, what is essentially, a circle whilst performing the moves.

02

Get up and jump around

I can't recommend this enough and although you may get funny looks from friends and family, getting yourself out of the chair and moving your body is the best reference there is. You don't have to go all out and push yourself to the limit, but do get up and get a feel for the poses, the shift of weight, being in balance and out of balance. A first-hand analysis of movement can only strengthen your work.

03



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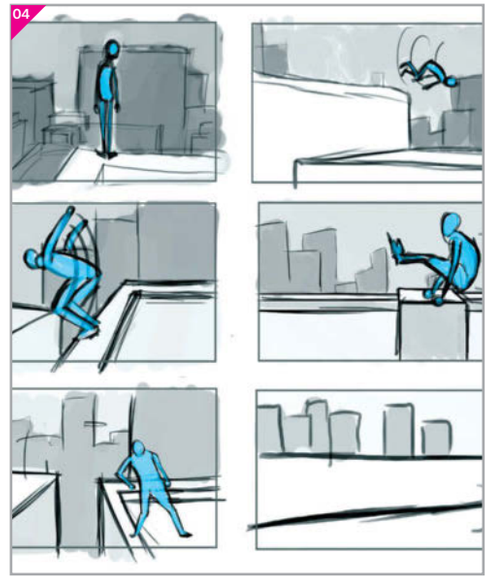

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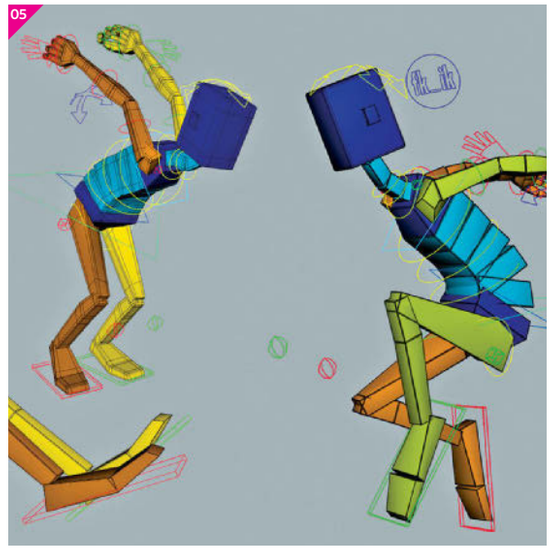

05 Get familiar with the rig Now that the planning is in place we are ready to bring in the rig and start animating. Before you do this, in a clean Maya scene import the rig and just have a little play with it. If you've broken your sequence down into a number of smaller shots, you can start considering which shots you'll use IK mode for, and which shots you'll use FK mode for. For example, we decided that any shot where the character needs its arms to interact with another surface, we'll set the mode to IK; and for any shots where the majority of the movement is either running, jumping or flipping, we'll stick with FK. You can use a combination of both and we'll look at that in part two of this tutorial. At this stage though, just try and pick one mode for each shot and roll with that to make things less complicated.

06 Create the cameras Back in Maya now, you should have the rig imported or referenced into the scene and a low-res or mid-res representation of the environment. At this stage, create a new camera for each shot and arrange them around the environment, basing your decisions on your animatic.
For the final framing we've gone for something a little more cinematic. We have set the Film Gate to 35mm Anamorphic. You can set this under the Film Back settings of the camera in the Attribute Editor. If you want to match the Resolution Gate to the Film Gate for rendering purposes, set it to 1920 x 816 in the Render Settings (under Image Size). The last thing to play with is Focal Length. Don't worry about getting this perfect now, we can always come back and edit the framing should we decide to later on. You'll also need to play with the camera's Near and Far Clip Plane as you work (under Camera Attributes in the Attribute Editor). Without this, you'll find parts of the scene will disappear or, worse still, not render.

07 Sketch the action in the environment Use the Grease Pencil (under View>Camera Tools) and sketch in the poses to get a feel for how the rig will flow through the environment. At this stage, you can quickly experiment with new poses, timing and also the framing of the camera. Another thing you can do is drop the character in and pose him roughly to give a better idea of scale and proportion as you lay down the poses with the Grease Pencil.

08 Block the key poses The key poses (also referred to as the golden poses) are the storytelling poses. If you had to tell a story with only a storyboard, these would be the poses that would fill those boards. Just a quick note: at this stage we have Default Out Tangent set to Stepped by going to Windows>Settings/Preference>Preferences, and then navigating to Settings>Animation. By doing this, we can focus purely on the poses rather than the transition from one pose to the next. Go through and add all the key poses in one Maya scene. Roughly add poses every 12 to 16 frames, and try to nail the poses that allow the core beats of the piece to come through. As we do this, make sure to work on the poses not just through the new camera view but also in the Perspective view, so that the poses feel natural and believable. This is going to be especially important should you wish to move the cameras later on or edit the poses. As you work on the poses, think about contrast, and how to go from one strong shape to another (for example from a c-shape to a straight shape). Also consider using squash and stretch by creating compressed poses and large expressive poses.

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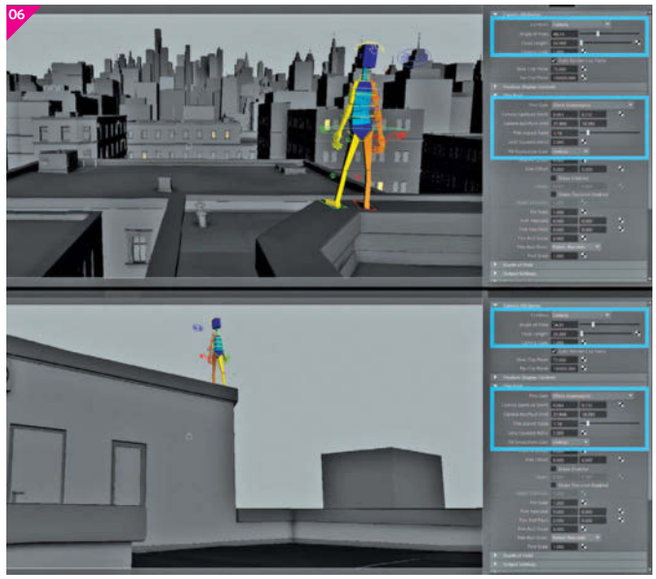
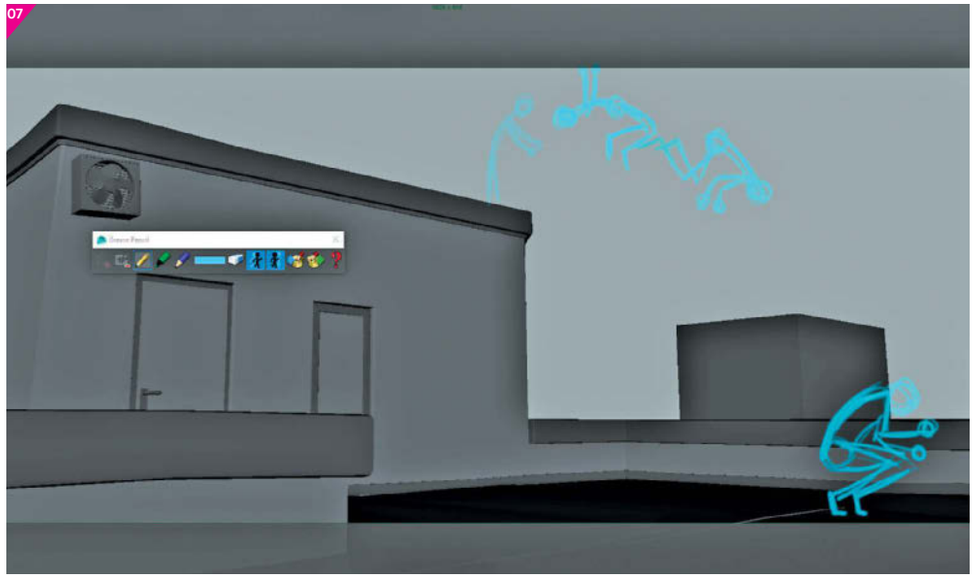


Use Parallel Rig Evaluation

If you are using Maya 2016, take advantage of the new Parallel Rig Evaluation. This should give you a performance increase when animating. Go to Windows>Settings/Preferences>Preferences. Then, under Settings>Animation, set the Evaluation Mode to Parallel and enable the GPU Override. As soon as you set a key on a control(s), you should see the effects kick in.

07



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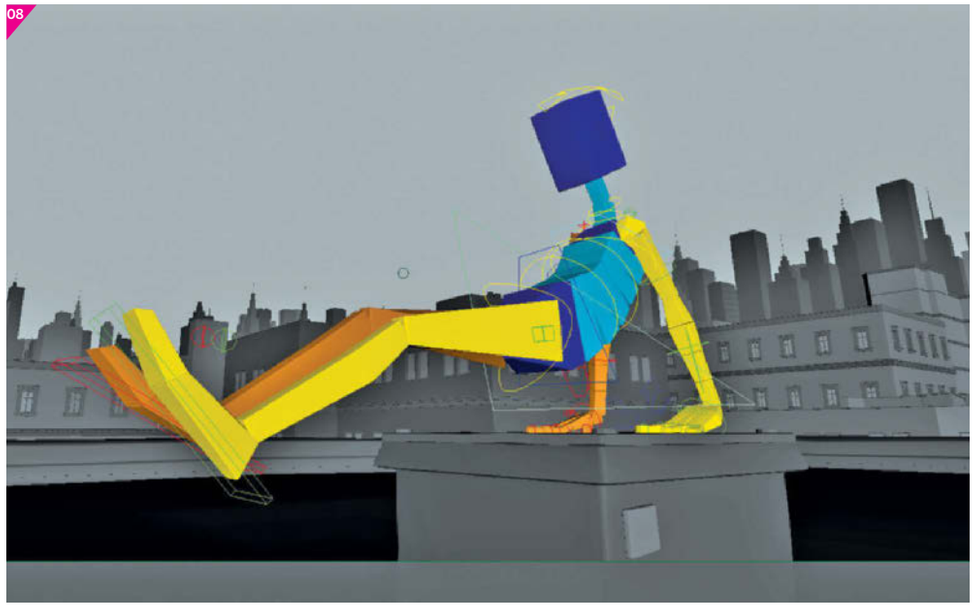
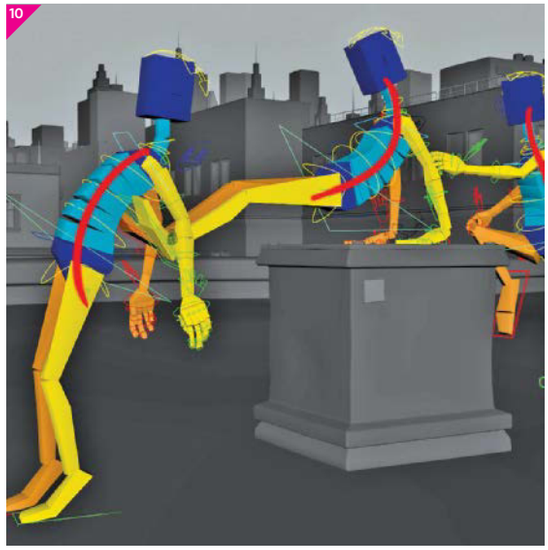


09 Break the scene into individual shots With the key poses in place, have a quick play with the timing of the poses to see how things flow. Playblasts were also created from each camera, the clips were dropped into Premiere Pro, and we did some further edits with the timing. Once we were happy with how things were going, we broke the main Maya scene down into individual scenes based on each shot. By doing that, we can have the rig perform more cleanly. If we had wanted to keep the entire motion going in one Maya scene, the chances are we would have encountered gimbal lock issues throughout, especially with the number of flips, spins and so on that we are planning to take on. For each shot, the key frames that were not part of the shot were deleted, and on some occasions we reimported a clean rig, used the global_ctrl to get the initial position into place and reposed the character. This would let us avoid as many gimbal issues as possible with the controls later.

10 Add the contact poses With the shots broken down now, the next stage is to go through each shot in turn and start adding in all of the contact poses (these are also referred to as the extreme poses). This is essentially where the character makes contact with any of the environment or has a change in direction. With the contact poses, we tried to place them evenly through the Timeline. This meant that we could easily add breakdowns between two contact poses later on. We have also started to make decisions regarding whether we'll be using FK or IK for the arms. The legs throughout the process have so far remained in IK mode.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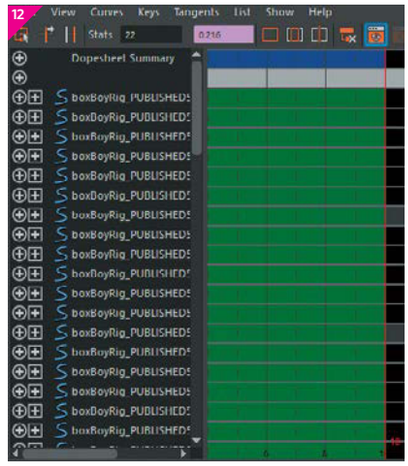

11 Add the breakdowns After the contact poses come the breakdowns. These are added between two contact poses and should illustrate how we get from one contact pose to the next. At this stage, we're still working in Stepped mode. Every now and then, however, we will take all the animation curves in the Graph Editor and set the Tangents to Spline. This is just to get a quick idea of how things flow in full motion and go from one pose to the next. Once you've had a little peek, set the tangents back to Stepped.

12 Retime, refine and reframe When you are happy with the poses, it's time to go in and refine them. As mentioned before, you should work all the poses from every angle. At this stage, it is also worth spending some time refining the timing of the piece. If you have keyed all the controls in one hit for every pose, you should be able to easily slide the keys around in the Graph Editor, the Timeline, or in the Dope Sheet. The last thing to do is to go in and tidy up or update the camera positions. Have a play with the Focal Length, the framing of the shots and also experiment with animating the camera or zooming in to certain aspects of the action. In the second part of the tutorial, we'll be adding some in-betweens, splining the animation and more.

Playblasts, playblasts and more playblasts

As you progress with your animation, make sure to create a playblast every now and again to see how things are working in real-time. It's also worthwhile comparing one playblast against another to see how things are progressing. I do this quite often at the blocking phase for timing.

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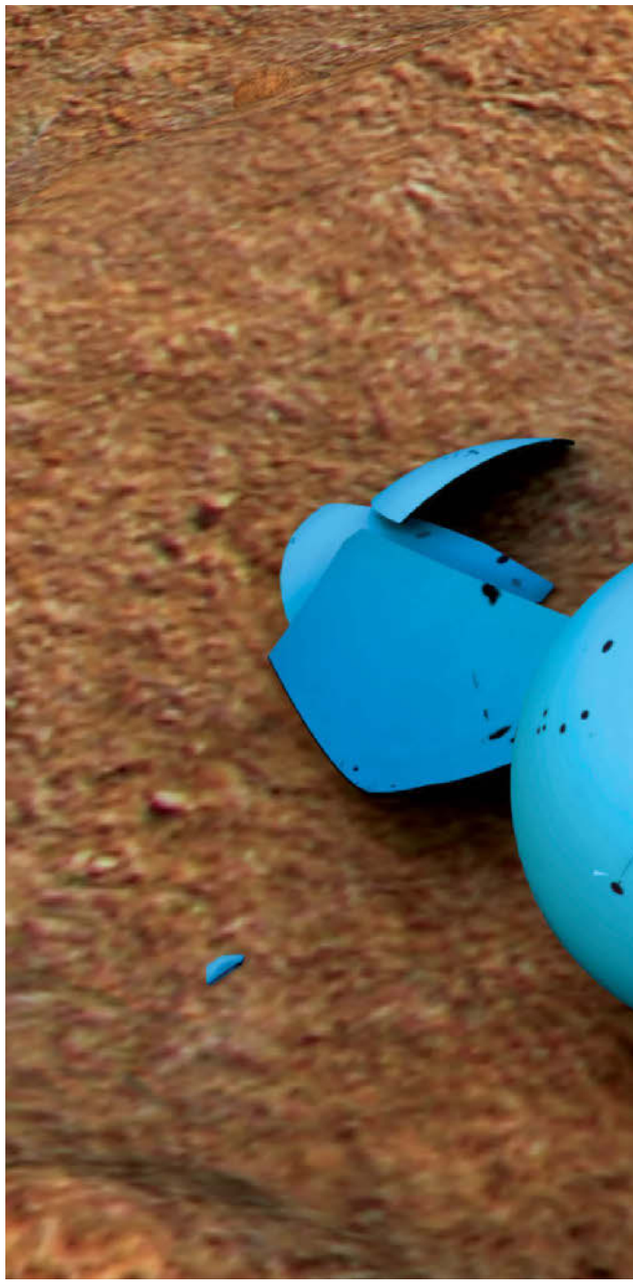
Pulldownit 3.7

If you want to make a CGI omelette, then why not let Pulldownit break the eggs?



Made by Thinkinetic, Pulldownit (PDI) is a dynamics plugin tailored for creating destruction effects and large-scale rigid body simulations. For this review the Maya 2016 version was used. Installation was a mildly daunting manual task as you need to place a few files in the right places then update a text document with the correct path on your machine. The documentation makes it straightforward for the most part, and there's an OS X installation video available online too, but a video for Linux and Windows would be welcome. Once set up, there will be a Tab on Maya's Shelf for accessing Pulldownit's toolset.

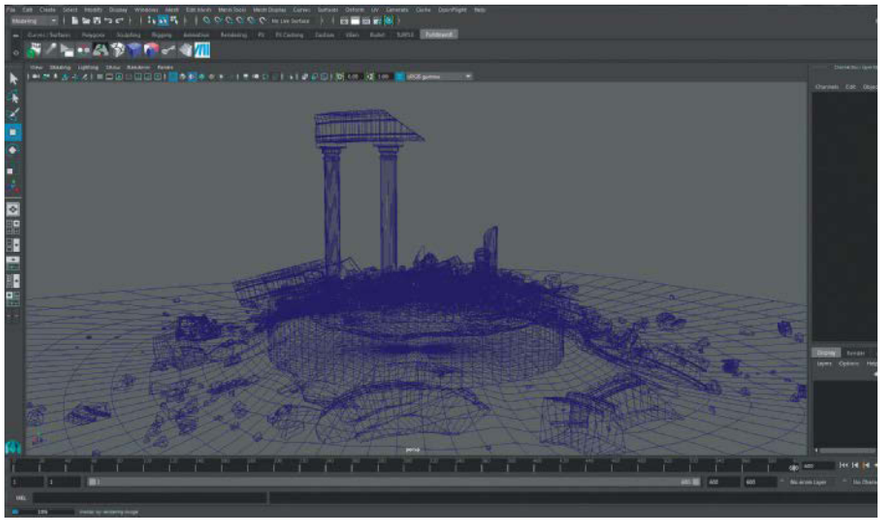
Destroying structures is PDI's forte, and on top of tools to tear down walls or entire buildings there's a shatter style for wood splintering and a radial style for glass. Maya force fields can also interact with PDI-generated dynamic bodies to create more stylised effects, and secondary destruction can be layered on top. To destroy a structure you'll often want an impact object or animated character to create the effect. By animating the impact object and converting the target geometry to a fractal body you simply need to choose the activation method: whether the geometry breaks on impact or at a specific start frame. A useful Stresses View is a colour map that indicates the distribution of hardness in your fracture group and when adjusting the settings gives visual feedback for changing stresses distribution. The available settings provide all the control needed for refining how subtle, or over the top you want the effect. For finishing touches, you can bake the simulation and tweak keyframes, make edges jagged and also assign a material to the newly cut faces.

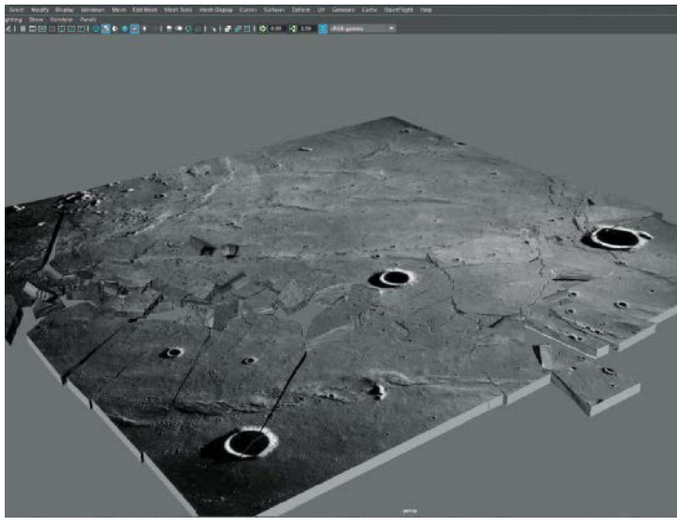
Using a simple scene depicting a section of a lunar landscape proved a good basis of exploring the parameters available in PDI for terrain fracturing. The workflow consists of drawing a curve for the fracture path and sending a Cracker rigid body object along the curve, which serves as a motion path for the Cracker to break up terrain. The Cracker feature is ideal for earthquake simulations and could serve other purposes, such as for an ice breaking ship traversing an ice sheet. How you model the geometry has a bearing on how it shatters too – we opted to create a detailed curve on basic geometry to follow a natural valley/fault line on the lunar texture. PDI cracked around that area successfully but for greater precision you'll need to model accordingly. Also, as you may expect, the distance between points on the motion path affects the speed of the cracker, which then influences the behaviour of fractured pieces.

Overall, PDI does exactly what it says on the tin. It's artist friendly so you don't need to be an overly technical person to find it accessible, and the learning curve isn't steep. The website tutorials give handy examples, but some could use a boost in audio/video production quality.

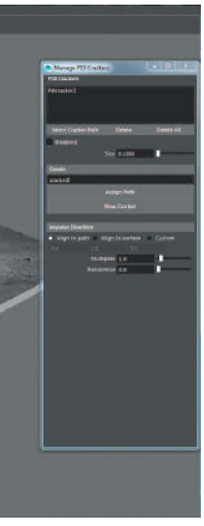
Creating detailed destruction is a challenge that takes time and during testing we were able to create expected results and then further refine these – all in a very timely fashion. Initial setup doesn't take too long and PDI is quick to compute, which makes tweaking a breeze. One small niggle we found after creating the cracked eggs scene was that numerous egg shell normals were at random, reversed and hardened. This required unplanned correction work, which became compounded by having multiple small fractures to deal with. It would be good to see the introduction of a wider range of features added to tackle less rigid destruction effects, such as sand simulation and cloth tearing.

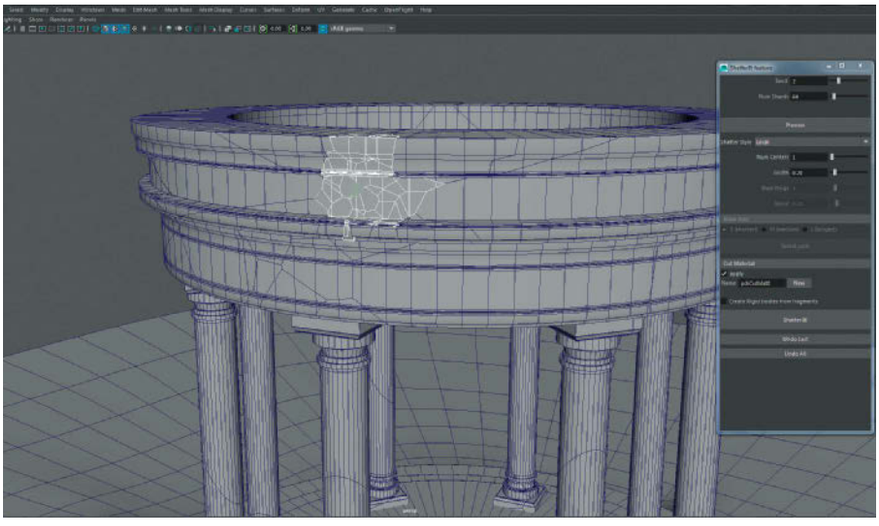
Paul Champion





“Maya force fields can also interact with PDI-generated dynamic bodies to create more stylised effects”



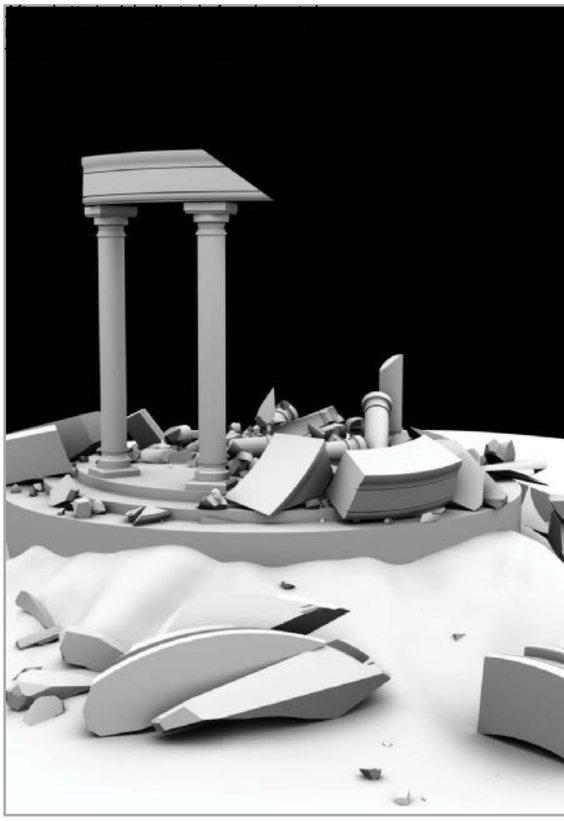


MAIN Pulldownit is more than capable of producing both full-scale destruction and also smaller, more detailed fractures

BOTTOM LEFT After shattering, a few elements were duplicated and left intact. They were placed to create the desired ruined look after simulation

BOTTOM MIDDLE You can adjust the amount of gravity so that fragments behave in different ways – ideal for creating lunar destruction scenes

BELOW AND BOTTOM RIGHT It is possible to increase the amount of detailed fracturing at the collision area for a more realistic impact



Essential info

Price	€395 single Maya licence
Website	pulldownit.com
OS	Microsoft Windows 64-bit all versions, Mac OS X 10.6 and up, Linux (contact website for Linux versions)
Disc space	1GB
GPU	64-bit Intel or AMD multicore
Compatibility	Autodesk 3ds Max, Autodesk Maya

Summary

★★★★☆ **Features**
★★★★★ **Performance**
★★★★☆ **Design**
★★★★☆ **Value for money**

Verdict ★★★★☆

Adding Pulldownit to your pipeline is simply a no-brainer if you need to raze a building, a town or even an entire city

Lenovo ThinkPad P70

The P70 raises the bar for ultra-powerful mobile workstations, with no compromise on performance

The configuration of the ThinkPad P70 sent to us by Lenovo is the most powerful mobile workstation we've ever tested, combining the very latest high-end mobile components, enormous amounts of memory and storage, and some specific useful features that are of particular interest to graphic designers. It's the first laptop we've reviewed with a mobile Intel Xeon processor in it, and it's also the first outing for Nvidia's Quadro M5000M, the firm's top-end Maxwell-based mobile graphics card.

It also has a highly colour-accurate 17.3-inch IPS screen with X-Rite PANTONE calibration, a feature that should make any graphics artist happy. This comes in either 1080p or 4K resolution and it not only offers a 100 per cent sRGB gamut, but also over 90 per cent Adobe RGB, which is higher than most standard desktop displays.

There are dual ThunderBolt outputs at the rear, with HDMI and MiniDP connectors at the sides, enabled for five external displays to be connected. Overall, the build quality is fabulous. The Trackpoint red pointing device sits in the centre of the keyboard; it's great to type on with angled chiclet keys, and the trackpad is roomy and apparently resistant to wear and tear.

Although a 17-inch screen and the thermal demands of powerful internal hardware necessitate a fairly large chassis, Lenovo's design means the ThinkPad P70 never feels excessively large or bulky.

The quad-core Intel Xeon E3-1505 chip in the ThinkPad P70 has a base clock of 2.8GHz, and reaches 3.3GHz in Turbo Mode. This chip is based on Intel's most recent Skylake architecture, and its Turbo Mode is clocked slightly lower than Intel's specification due to thermal and power constraints.

The Quadro M5000M has only launched recently and it packs considerable graphics power. With 1,536 cores, it'll have no problem rendering on-screen visuals, while simultaneously performing background compute tasks such as powering the iRay plugin for 3ds Max. It's also the first mobile graphics card we've seen with 8GB of dedicated video memory.

Another notable aspect of the ThinkPad P70's hardware configuration is a whopping 64GB of ECC DDR4 memory. Again, this is a new mobile milestone, the largest memory capacity we've seen in a laptop, and enough to satisfy really demanding 3D work.

And just to round it off, there are dual PCI-Express SSDs in the form of two Samsung SM951s, each with 512GB of space and configured as a RAID 0 array.

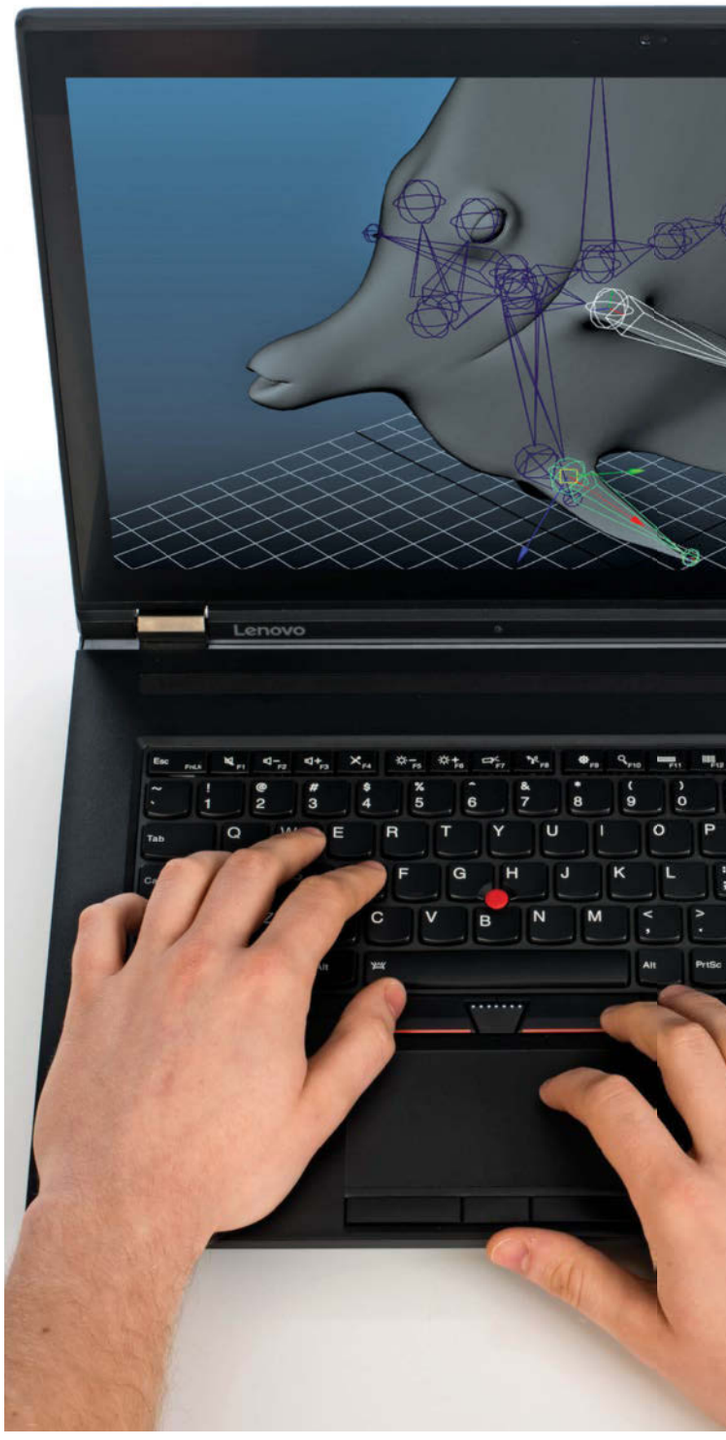
Forget specifications, the true deciding factor is performance, and here the Lenovo ThinkPad P70 impresses in some areas that matches or even beats desktop systems.

The Xeon E3-1505 even edges slightly ahead of Intel's desktop Core i7-6700K processor in CINEBENCH 15, while the storage array manages over 1GB/sec read and write speeds. And the Quadro M5000M achieves the highest SPECviewperf results we've seen from a laptop.

The 3ds Max underwater scene at 1080p completed in 15 minutes. This is slightly slower than desktop chips, as expected, but older chips have to work harder to achieve that result, using higher clock frequencies, and this indicates that the Xeon E3-1505 is considerably more efficient.

So that's the ThinkPad P70 in a nutshell, and as you've probably guessed, all this lovely silicon comes at a very high price. The 1080p version we were sent costs £4,430, and a 4K screen adds to this price further. There are cheaper options though. A base model ThinkPad P70 sets you back £1,699, but lacks most of the very bells and whistles that makes this more high-end configuration so interesting. Even so, a few choice cuts here and there – less memory, a cheaper SSD and a slightly lower graphics card – means you can save over £1,000 easily.

Orestis Bastounis



MAIN The IPS LCD display enables close-to 180-degree viewing angles and high brightness

LEFT Four USB 3.0 ports combine with an HDMI, a MiniDP and three Thunderbolt ports to enable plenty of connection choices

BOTTOM MIDDLE Even with a Trackpoint pointing device included, Lenovo's keyboard is large with wear resistance

BOTTOM RIGHT Kitted out with a Xeon chip, the P70's high-end configuration uses the latest Intel architecture

BELOW The P70's spectacular colour accuracy is all thanks to X-Rite PANTONE's carefully calibrated sensors

> It's great to type on with angled chiclet keys, and the trackpad is roomy and apparently resistant to wear and tear

Essential info

Price	£4,430
Website	lenovo.com
CPU	Intel Xeon E3-1505 processor
GPU	Nvidia Quadro M5000M graphics card with 8GB GDDR5 memory
RAM	64GB ECC DDR4
SSD	2x Samsung SM951

Summary

★★★★★ **Features**
★★★★★ **Performance**
★★★★★ **Design**
★★★☆☆ **Value for money**

Verdict ★★★★½

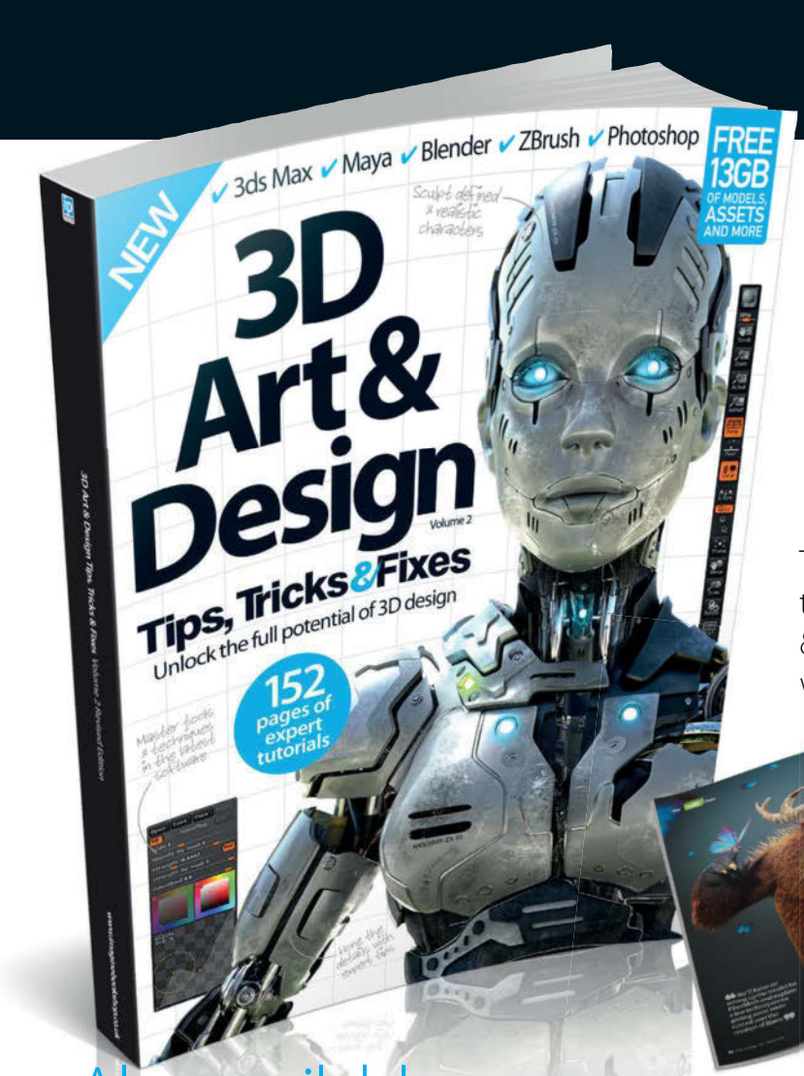
If you can't meet the pricing, then a few small changes to the spec can make the P70 a better-valued prospect

From the makers of 3DArtist

3D Art & Design

Tips, Tricks & Fixes

To take your design skills to the next level, you need to learn the tricks that make everything easier. 3D Art & Design Tips, Tricks & Fixes provides just that, so discover how to speed up your workflow and produce perfect art without a hitch.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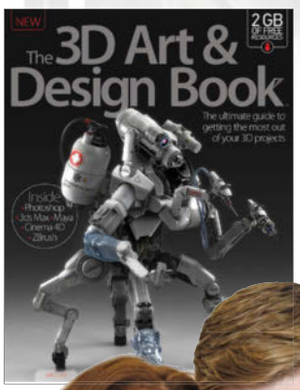

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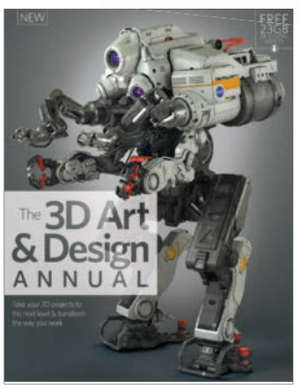

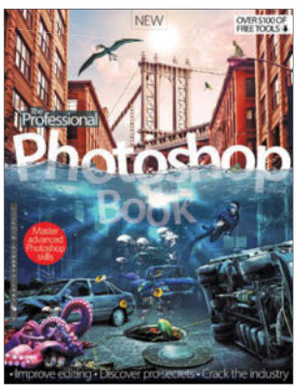

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The Hub

The inside guide to industry news, VFX studios, expert opinions and the 3D community

INSIDE ILM PAGE 86

> So many films are being made in the UK: many of the big franchise films are all being shot out here

David Vickery, acting creative director at ILM London

080 Community news

Creativepool

The winners of the 2016 Creativepool Awards have been announced. Find out how they made their winning projects

082 Industry news

Amazon Lumberyard

Another company jumps into the game space, Golaem gets an update and Maxon rethinks the backend of Cinema 4D

086 Industry Insider

David Vickery

ILM London's acting creative director reveals how the big UK experiment has been a resounding success for the famous studio

092 Social

Readers' Gallery

The latest images created by the **3dartistonline.com** community

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Take a look at Taylor James's winning piece, Stagley, at **creativepool.com/taylorjames**

> Stagley allowed us to use our creative knowledge to help the client refine their vision
>
> **Emily Fitzgerald, group marketing director**

Creativepool announces 2016 award winners

After an astounding 12,000 votes came in for just one award, the three winners of 2016's 3D category and the winner of the People's Choice award have finally been revealed

The results are in: esteemed judges Glen Southern, Ines Palmas, Ben Mauro, John Fox and Grzegorz Kukuś selected Taylor James, INK and Nucco Brain as the winners in the 3D category. Bomper Studio scooped the people's award which had a high turnout of over 12,000 voters. Each winner gains a spot in the limited-edition physical copy of the *Annual 2016* that's distributed amongst some of the top creative companies in the world, and adds the highly sought-after Winner's Badge to their Creativepool profiles. A digital version of the *Annual* is available online too.

Taylor James is a fully integrated production company with studios in New York and London. The team consists of multi-disciplined artists who collaborate with agencies and brands to create campaigns across all media, from concept to completion. Its winning entry, Stagley, was created by a team of seven artists in six weeks. ZBrush, 3ds Max and Photoshop were used in this piece for Heimat Berlin, to be used by its client Volksbanken Raiffeisenbanken.

"We are driven by our client's creative vision," explains Emily Fitzgerald, group marketing director. "They wanted a fantastical forest creature. We created the character from concept to completion, and ended up with the bright, warm Stagley. As a team of creatives [who specialise] in various disciplines, we get excited when we have a project that allows us to collaborate across skill sets. Stagley allowed us to use our creative knowledge to help the client refine their vision. Through several rounds of character development, we were able to combine their vision and our skills to develop Stagely. Our animators, CGI team and retouchers worked together to create a character that was used in print, digital and online mediums."

Founded in 2009 by David Macey and Kamen Sirashki, INK's winning entry was its Land Rover Discovery Sport project, which used a combination of 3ds Max, NUKE, V-Ray and After Effects. "Our aim was to create an animation that remained visually engaging while clearly and accurately explaining the Discovery Sport's packaging achievements. Achieving this technical accuracy was one of the biggest challenges we faced in this project," says David Macey, creative director. Land Rover's engineers supplied CAD versions of the Discovery Sport model. "Translating this CAD data over to our 3D pipeline in 3ds Max was fairly

complicated; the data comes through as raw models with no materials. Each piece of geometry needs to be checked or remodelled, and have textures and shaders applied. Every soft surface in the car also had to be remodelled. That included the stitching in the seats, leather components, car doors, instrument panel – none of that comes through with the CAD data." Choreographing the loose car parts in the explosion sequence was another big challenge too.

Nucco Brain is a buzzing storytelling studio in London's Tech City. Its entry, At First Sight, is about Brian, a typical 21st Century hipster, who is struggling with a common mobile addiction. It used Photoshop for the concept stage, texture and background painting; Maya for 3D modelling and animation; V-Ray for the rendering; TV Paint for the classical animation elements and After Effects for compositing and VFX. "We really wanted to demonstrate that there should be no difference for the viewers between 3D and 2D animation. We wanted a great little film which could take the best of the two worlds and mix them seamlessly. Solving that tension was our primary goal and challenge, and we experimented quite a lot to find the best look and feel," reveals Stefano Marrone, animation producer and managing director.

Nucco Brain Studio's At First Sight was one of the winners and can be viewed at **creativepool.com/nuccobrain**

You can find out more about INK's Discovery piece at **creativepool.com/weareink**

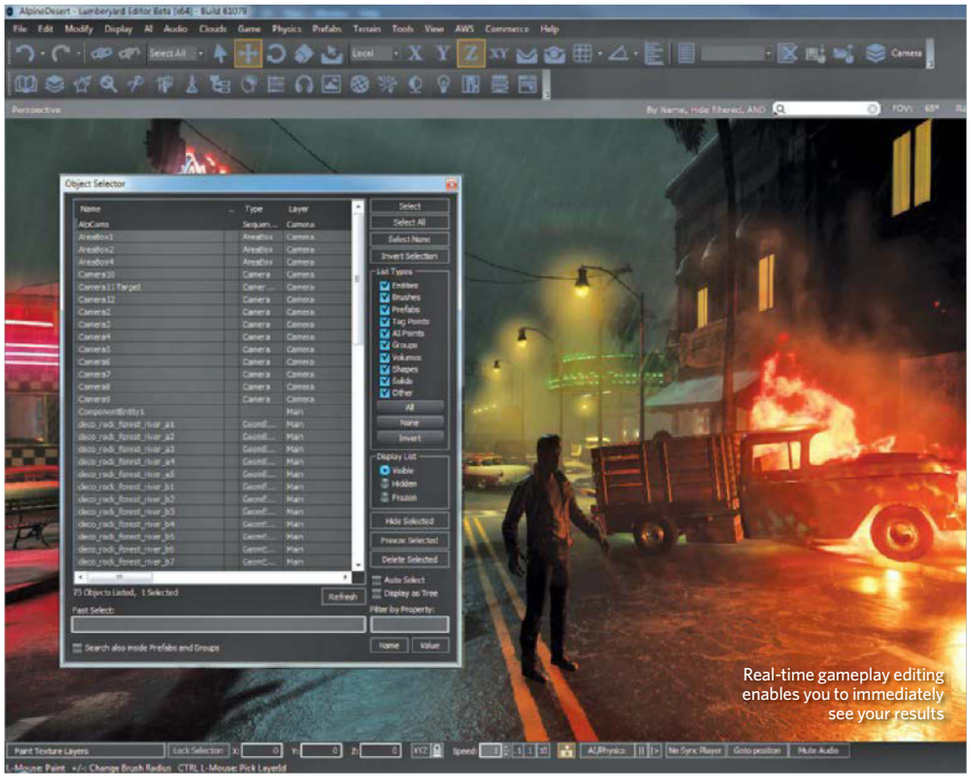
Check out Bomper Studio's winning piece by going to **creativepool.com/bomperstudio**

Bomper Studio wins People's Choice Award

Taking first place, the Welsh studio won over voters with its creative spin on an iconic image of Marilyn Monroe

Boutique CGI outfit Bomper Studio specialises in 3D visualisation and animation for digital and print. Its entry was inspired by Coca Cola's 'I've Kissed Marilyn' adverts, using the project as an exercise in blending character design and vintage iconography with hyperreal lighting and materials. Cinema 4D was used for modelling, rigging and sculpting. Rendering was handled by C4D's advanced renderer. All post-production was completed in After Effects.

"The main difficulty with this project lay with the liquid. Our CG artists worked tirelessly to get the shape of the splash feeling real and correct while wrapping it around Marilyn to get the dress effect that the concept demanded. We also struggled with getting the rich colours of [Coca Cola] to show through. After trying various approaches, we employed the same technique that photographers do: shooting the liquid with gold foil behind it to bring out deeper, vibrant tones. It was a challenge, but a rewarding one," explains Emlyn Davies, creative director. "We consider our attention to detail and our striving for a kind of hyperrealism to be part of our signature style. The Marilyn project is a good example of this."



Amazon unveils game-dev products

AWS launches cross-platform game engine Lumberyard and multiplayer game service GameLift

Lumberyard is a new 3D game engine released under the Amazon Web Services (AWS) banner. It's available in beta for developers building PC and console games, with mobile and virtual reality platforms coming soon.

The engine has an editor with hundreds of features including cloth physics, character and animation editors, a particle editor, a UI editor, audio tools, weather effects, vehicle systems, flocking AI, perception handling, camera frameworks and more.

Amazon-owned Twitch is integrated with Lumberyard along with AWS's C++ SDK. Other AWS services such as DynamoDB, Lambda and S3 can be connected with Lumberyard's visual scripting tool.

"Many of the world's most popular games are powered by AWS's technology infrastructure platform," said Mike Frazzini, vice president of Amazon Games. "When we've talked to game developers, they've asked for a game engine with the power and capability of leading commercial engines, but that's less expensive, and deeply integrated with AWS for the backend and Twitch for the gamer community. We're excited to deliver that for our game developers today with the launch of Amazon Lumberyard and Amazon GameLift."

Lumberyard is free and includes full source code. Standard AWS fees apply for GameLift, which comes under Amazon's Web Services umbrella.

Scalable gaming service GameLift

Amazon's new GameLift service lets developers with little or no backend experience scale game servers to meet multiplayer demand. It can accommodate millions playing session-based multiplayer games in the cloud. Lumberyard games are ready to use with GameLift without additional engineering effort or upfront costs.

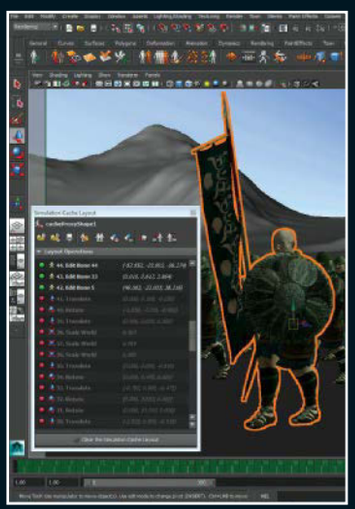
Golaem adds Crowd 5 tool

New Layout Tool administers crowd control, and gets stand-alone release

Post-simulation editing has been introduced to Golaem Crowd 5 via its new Layout Tool. Artists can now access simulated characters to complete tasks such as retiming and offsetting animation, editing posture, repositioning with Maya's transform tools, adjusting props and character appearance, and duplicating or deleting individual characters. These changes can also be modified or removed using the History Stack.

Nicolas Chaverou, Golaem Crowd product manager, explains its efficiency: "Before, artists had to go back to the beginning of the workflow to move a character a bit, simulate, re-export everything... All this without even being sure if the modification will be validated or not. Now they can just select a character, translate it left and it is done! They can see the result at once thanks to Golaem advanced viewport pre-visualisation."

The Layout Tool is also available without simulation capability as a standalone product called Golaem Layout for shot layout, retakes and building a reuseable simulations library.



Other new Golaem 5 features include Asset Variations, Trigger Editor and Blind Data

HAVE YOU HEARD? RenderMan 21 is coming out this year with over 60 new features, new materials and lighting workflows

Maxon to reboot core architecture?

Cinema 4D core development is quietly in progress behind the scenes

Having used the same architecture for 16 years, Cinema 4D will soon be given a new lease of life with fresh foundations. Work on the new modular core will include a highly efficient threading system for massive data parallelism and new optimised data structures. The new architecture work has been underway for the last few years, and is being added to gradually with each release. "Everything is based on a highly modular architecture that allows us to combine the current Cinema 4D with the new core. This in fact took place in release 16 and means that you are in part already experiencing the future of Cinema 4D today!" reveals Harald Schneider, CTO and managing partner, on the company's blog. "Transitioning Cinema 4D fully to the new core will still take several more releases." You can read the rest of the blog at bit.ly/1YmHAGw.

The digital clock is ticking for Cinema 4D's 16-year-old architecture

Image by AixSponza

SketchUp gets scattering plugin

Time-saving object scattering and instancing plugin Skatter is now available for SketchUp

To quickly populate scenes with assets such as vegetation or lamp posts, Skatter provides dozens of options and parameters for scattering, such as along curves, at specific chosen points or in precisely painted areas. And being fully parametric you can edit settings at any time with the new SketchUp plugin.

The Render only feature helps large scene performance by sending scattering data directly to a render engine, and is currently supported by Thea Render, V-Ray, Corona Renderer, Twilight Render and other render engines. To use Skatter with other render engines, uncheck Render only.

The Foundry reveals SLIK 2

Expanded lighting toolkit helps MODO artists create lighting setups for high-quality rendering

SLIK 2, Studio Lighting & Illuminance Kit, is a toolkit of items, presets, scenes and materials designed to simplify lighting setups and improve workflows in MODO for artists who struggle to use standard lighting tools.

The new release improves on the functionality of the original, adding key new features such as a Light Board Controller menu for adjusting SLIK lights and accessing tools, 34 new 4K light textures for hi-res rendering, a smart material library and HDR Baking.

Workflow optimisations in SLIK 2 include custom preset saving, material overrides for lighting tests as well as light positioning improvements for selecting on a mesh where a highlight needs to be.

SLIK 2 is compatible with MODO 901 and up, and a new licence costs $149

Software shorts

Bringing you the lowdown on product updates and launches

MochaBlend C4D plugin

Import Mocha 2D planar tracking data and roto splines into a 3D-solved Cinema 4D workspace with MochaBlend C4D. Features include a single plane solver, roto splines to animated geometry conversion (with depth to interact with physics and simulations) and much more. MochaBlend C4D is $250. Learn more at **imagineersystems.com**.

ManuelLab 1.0

A toolset for character creation in Blender, you can create human and anime characters, set anthropological phenotypes and more using ManuelLab 1.0. Meshes are optimised for subdivision surfaces and sculpting. The next version includes expanded anime characters with more styles. ManuelLab is free, get it from **manuelbastioni.com**.

Asset Management

This Blender add-on has been designed to help you with staying organised, by letting you add any kind of assets to your own libraries. Thumbnail images are automatically generated but you can choose a custom render if you prefer. A free asset pack of screws and bolts is also included. Buy Asset Management for €15 from **pitiwazou.com**.

DID YOU KNOW? Chaos Group has launched a new service called VRscans for creating physically accurate real-world materials

Technique focus

Incredible 3D artists take us behind their artwork

TEXTURING After making eight UDIMs (roughly according to the different materials), the first thing I did was collect references and base textures. Texturing is an iterative process; you want to build things layer after layer. I ended up using a mix of photo projections and procedurals. I also used AO and grunge maps to drive the dust into occluded areas.

Arthur Gatineau
artgatineau.com
Arthur is a 20-year-old 3D artist from France. He enjoys modelling, texturing and shading

Software 3ds Max, MARI, V-Ray

Peugeot 205, 2016

CHECK BACK NEXT MONTH FOR PART 3!

Dell Precision 17 7000 Series

In part two of his diary, Paul Hatton experiences the raw power of his new workstation

Having now had the opportunity to get to grips with the 7710, I am really impressed with its performance and responsiveness. The hardware really does pack a punch and enables me as a 3D artist to deliver consistent results quickly. For example, on my previous desktop workstation I would suffer regular 3ds Max crashes and slow render times, but thanks to the Intel Xeon processor and the Dell Precision Optimizer I absolutely fly through jobs with no problems at all.

When working to tight deadlines I need hardware and software that is going to be reliable and the 7710 is most certainly that. Even on seriously heavy scenes, in terms of polygon count, the machine handled it all with incredible ease, thanks to its Intel Xeon CPU and its AMD FirePro W7170M professional graphics card, which supports OpenCL. It seems that whatever I threw at the hardware, it chews it up and spits it back out with no hassle!

I really can't fault the hardware and it's incredible that it's all packed into a portable workstation. The fact that Dell has designed the workstation with specific artist-related software in mind is really obvious as I've used it. Dell's rigorous testing also means that I've been able to rely on the workstation for all of my arch-vis projects.

I suppose the only area that I've not enjoyed so much is with its portability. The device itself is thin, light and portable, which is great but the associated charging unit makes it a little difficult to move around. Despite this though, the 17-inch screen is amazing and means that even though it was difficult to carry around, it was a delight once I actually set it down and got to work.

Mission critical reliability

Dell has teamed up with software companies to deliver reliable and fully optimised workstations

One of Dell's primary selling points for its Precision workstations is that it has teamed up with specific software developers to ensure that its hardware performs reliably and optimally. I was pleased to hear that Autodesk and Adobe are two such companies that Dell has linked up with. I utilise a large chunk of the Adobe suite as well as several Autodesk programs, so I could rest assured that the workstation would deliver.

It's worth bearing in mind that AMD FirePro cards, like the FirePro W7170M that features in this workstation, are Adobe and Autodesk certified, meaning they're fully compatible with all of the tools I need for work. I rely on my workstation for delivering work to clients, not just for personal things, which makes this reality a big plus for me as a 3D artist.

It's also worth noting that Dell offers a support service called ProSupport, which gives users the necessary help for hardware/software challenges, accidental damage repairs and even on-site support. So even if something does go wrong, Dell is there to help.

Job Acting creative director

Website ilm.com/offices/london

Location Industrial Light & Magic, central London

Biography David Vickery began his career as an industrial designer before pursuing studies and training in moving image production. After graduating with his MA he secured work in the London VFX industry. In late 2015, Vickery took up the post of acting creative director at Industrial Light & Magic's flourishing London studio.

Portfolio Highlights

2017 *Star Wars Episode VIII*
2016 *Rogue One: A Star Wars Story, Teenage Mutant Ninja Turtles 2*
2015 *Jupiter Ascending*
2013 *Fast & Furious 6*
2010/11 *Harry Potter And The Deathly Hallows Parts 1 and 2*
2008 *The Dark Knight*
2005 *Batman Begins*

INDUSTRIAL LIGHT & MAGIC
LONDON

David Vickery

Acting creative director

The award-winning lead reveals what's in store for ILM's burgeoning UK office

As acting creative director, David Vickery's role at ILM is to function as a critical bridge between studio clients and his colleagues at the studio. In our conversation, Vickery talks about ILM London's creative sensibility, its recruitment process and what the future holds as the studio establishes itself as a visual effects house and as a key creative voice in the broader film-making process.

"Part of the reason to set London up is because many of our clients are here," explains Vickery as he tells 3D Artist about the new role that he's taken on at ILM's London studio, which opened its doors in October 2014. He goes on to describe how the studio fits into the film industry's bigger picture as well as the broader, global view for ILM. "So many films are being made in the UK: many of the big franchise films are all being shot out here. There are so many European and American directors now that are based in London."

Additionally Vickery notes that the wider suite of production tools at ILM London's disposal means that it can continue as a visual effects studio but also "broaden ILM's horizons again as film-makers and a production house". ILM London is the fourth ILM studio to be established following those in San Francisco, Singapore and Vancouver.

Vickery's acting creative director role reflects the current situation at ILM London, in which the studio's creative director Ben Morris has taken on the role of visual effects supervisor on *Star Wars Episode VIII*: "My personal desire, and I know Ben Morris feels the same, is that the London studio can really help ILM grow and develop, and be part of how films are made and not just how films are posted."

He goes on to explain that Ben Morris realised that "London would need a creative head in his absence: to run the studio day-to-day, meet with clients, promote the company, help with recruitment and be a creative father figure, for want of a better term, in London. Where people start to come up against problems or need help and advice, I can be there for that."

Describing the dynamic between clients and ILM London, Vickery reveals: "You're trying to advise the film-makers as best as possible. In a way, you're almost doing the opposite of what you'd expect your job to be. You'd expect to advise on how to make the VFX work for the film but often you're advising the film-maker how to actually shoot things for real."

Vickery goes on to outline the ILM production model of the hub: "The first time when one of the other ILM facilities other than San Francisco has hubbed a show was London (for

> "The London studio can really help ILM grow and develop, and be part of how films are made"

01

02

01 ILM London's recruitment process is far reaching as it evolves as one of the four global ILM studios

02 For *Spectre*, ILM London was used for production support, its tech and pipeline engineers and much more

> All anyone really cares about is: how do you make it a better experience for the viewer?

01 The latest wise old soul to join *Star Wars* is Maz Kanata, a character brought to life at ILM London

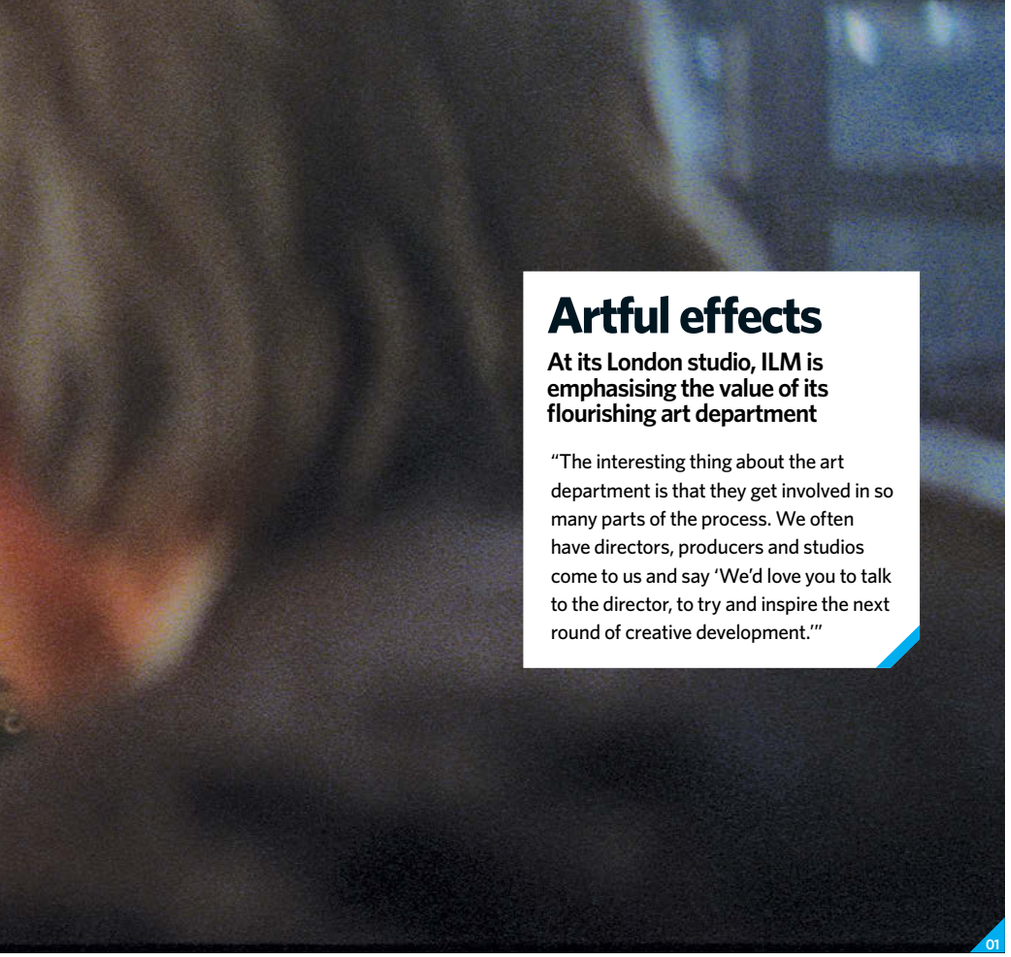
02 This hero shot shows how character creation and animation expresses inner feeling

03 Opened in October 2014, ILM London actively seeks out both new and experienced VFX artists

04 In this image, a digitally created element has been composited with the live action plate

05 For *Star Wars: The Force Awakens*, ILM London's key work centred on character animation

06 Hend House is home to ILM London and the company's renowned global art department



Artful effects

At its London studio, ILM is emphasising the value of its flourishing art department

"The interesting thing about the art department is that they get involved in so many parts of the process. We often have directors, producers and studios come to us and say 'We'd love you to talk to the director, to try and inspire the next round of creative development.'"

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Spectre). One studio will always be responsible for the day-to-day control and management, and they will report directly to the client to present the work and distribute the work across the facilities. Those facilities would then be creatively responsible for their own work, but the day-to-day management – setting up the pipeline, interaction with the director and the supervisors – would come out of the hub. London was set up to hub projects so we've been tasked with having the right mixture of artists, production support, tech and pipeline engineers, and R&D to be able to hub projects, manage projects and spread work out across studios. So, for *Star Wars: Episode VIII* we're actually hubbing. ILM is not a visual effects facility – that's just a small part of what we do. We're involved in art direction, pre-production, post-production, and virtual production. All of those things come under the remit of what ILM do."

Always open to new talent, Vickery notes ILM's recruitment process: "We attend the animation festivals like FMX Stuttgart and SIGGRAPH, recruit through our website and people cold call us. The recruitment team here don't want to miss a trick, so they try and follow up on as much as they can. We have internship programmes here. I think it's important to train within the building. [People have a perception that ILM] only employ the most senior, talented artists. Now, that's true to a certain extent but it's also important to find the new talent and foster them. For me, there are definitely skills that you can only learn on the job. Part of that is managing a team of artists, of just being immersed in film and learning the on-set side of stuff and the process that you have to go through when you're making a film. You can only learn that on the job, so I think it's important to encourage new talent and younger artists who don't have much experience and bring them up through the company. ILM has a huge suite of tools in their pipeline, custom-built and written by ILM engineers and software developers, and so there's always a learning curve."

> "It's important to encourage new talent... and bring them up through the company"

As our conversation concludes, Vickery encapsulates the heart and soul of the creative vibe at ILM London, "All anyone really cares about is: how do you make it a better experience for the viewer, how do you make better shots? How do you make people just really enjoy the experience? We all want to make the one shot, that one amazing shot, that everyone remembers from being a kid."

Getting into motion

Vickery's entry into the visual effects industry followed his MA studies. He continues to apply this knowledge to the aesthetics of visual effects

"I did my industrial design degree, and then when I finished I went to London Guildhall and did a course called Digital Moving Image (a Master of Arts). [I then] spent about six months pestering Double Negative and I came through the ranks as a 3D artist, texturing."

Technique focus

Incredible 3D artists take us behind their artwork

DETAILING My goal was to create a close-up shot inspired by Weta Digital's *Apes* films. I used HD Geometry in ZBrush to create HD detail in sculpting. It's important that you have sufficient detail on the surface to provide high-quality Normal and Displacement maps. Knald helped create sensitive Cavity maps that were used for Specular maps.

Yuki Sugiyama
yukisugiyama.com

Yuki is a lighting/lookdev artist with professional experience at Tokyo-based animation studios

Software Maya, V-Ray, NUKE, MARI, ZBrush, Knald

More Than Meets The Eye, 2015

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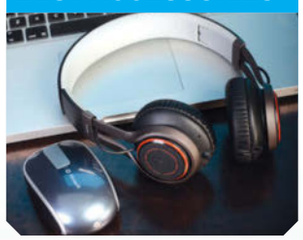

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Images of the month

These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

01 Hungry Viking

by Ali Jalali
3DA username alijalali

Ali Jalali says: "About a year ago I saw artwork from a talented Polish illustrator, Michal Dziekan, on the internet and decided to convert it to 3D artwork. Here is the result."

We say: *There's so much character to this image! It's hard to figure out where to start here, as we love all of it. Full credit to the original concept, and Ali has done a wonderful job of converting it to 3D. Brilliant textures, brilliant sculpt.*

02 25%

by Erik Hellmouth
3DA username erik hellmouth

Erik Hellmouth says: "I heard someone on a TV show say that she can't eat meat from something that she once had eye contact with – I thought it was a pretty interesting saying."

We say: *What a strange scene! We really like it, though – it's nice to see an artist thinking a little differently and approaching something with a different viewpoint. We were really impressed with the lighting here, too.*

03 The Lamp

by Tarek Youssef Gerges
3DA username Render Mob Designers

Tarek Gerges: "I decided this time to add more realism by adding a depth-of-field effect, and focusing on the main object which is the lamp in this image. I added dirt to the image to give the dirty lens feeling, which adds a tremendous amount of realism."

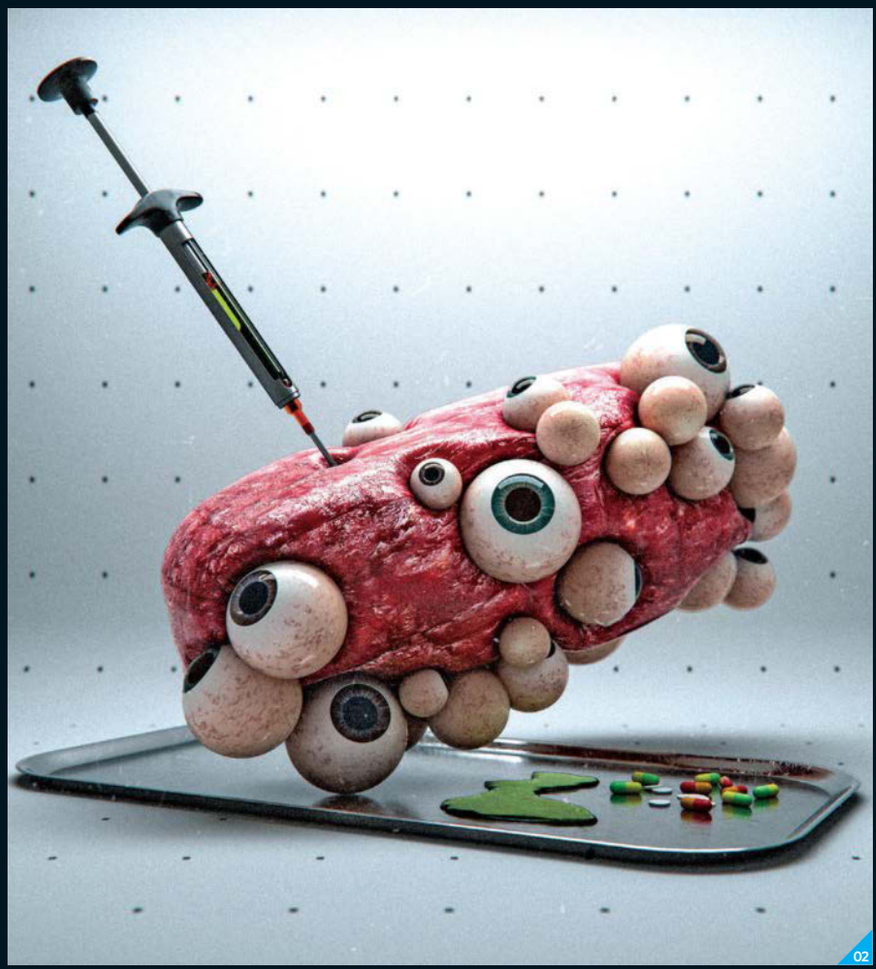
We say: *Tarek has featured here before as his arch-vis work really tends to stand out. His instinct for good composition is also well worth a mention here.*

04 Scandinavian Room

by Basem Mohsen
3DA username Basem Mohsen

Basem Mohsen says: "The aim of this project was to create a realistic scene that would feel relaxed, so I studied the lighting, colours and composition of the scene to give a calm mood to the space."

We say: *It certainly does seem calm in that room – Basem's intended sense of relaxation definitely comes through in this piece. The fabric of the sofa and the chipped floorboards are particularly good.*



Bunch Of Peaches **by Mohsen Hashemi**

3DA username Mohsen

Mohsen Hashemi say: "I always love the freshness and taste of peaches, and I especially wanted to see how this tasty fruit looked in high resolution."

We say: *Getting your textures right when you're working on images of fruit can be really tough, but Mohsen has done a fantastic job of re-creating peaches in 3D. Awesome work.*

Hurry Up **by André Demétrio**

3DA username AndreDemetrio

André Demétrio says: "Hurry is a character inspired by me – I'm always really happy and in a hurry to deliver amazing projects. His suitcase represents his boldness and excitement! He is totally ready for his next adventure!"

We say: *This is excellent work from André. Great colour choices and lovely posing make for a really interesting and cheerful image.*

Spider's Home **by Oliver Kieser**

3DA username DigitalDream

Oliver Kieser says: "The spider was sculpted with ZBrush 4R7. Rendering was done with KeyShot 6 and post-production was done in Photoshop Elements 13."

We say: *Oliver has a wonderful and unique style that makes his work instantly recognisable. This is a strong sculpt and it's a well-executed scene overall. We wouldn't want to be caught in this spider's web, that's for sure!*

The VFX force behind Star Wars

Find out how Escape Studios helped to take the VFX from one of the biggest film franchises to hyperspace and beyond

Star Wars: The Force Awakens broke box office records when it opened last year and was the fastest film to reach the billion-dollar mark in ticket sales. This box office smash took the world by storm, but what was it like working behind the scenes of such an iconic movie? Carlos Conceição, digital compositor, was part of the VFX team at Industrial Light & Magic (ILM) which gave the movie its winning special effects.

"I still can't believe I just accomplished the dream of working at Industrial Light & Magic on my favourite movie, surrounded by the most amazing visual effects crew you could ever imagine: devoted, extremely humble and talented artists that pushed the limits to help produce the most expected movie of the decade! Incredible experience that I will never forget."

Following the 2016 BAFTAs, Carlos can now add the accolade of being part of the team that won the Special Visual Effects Award to his CV. If your dream is to turn your love of VFX into an award-winning skill, here's how Carlos shot to VFX stardom.

"I studied compositing at Escape Studios, part of Pearson College London, and this was the spark that started the fire. I had an amazing selection of tutors who inspired me to work hard, they were extremely talented and with huge experience. I was able to absorb a vast knowledge about the visual effects pipeline and that was extremely helpful

when I started my first job at Electric Theatre Collective, also arranged through Escape Studios."

Carlos is just one of many award-winning students who have passed through the doors at Escape Studios. Over 4,000 students (dubbed 'Escapees') are enjoying careers at the best studios around the world, and this hub of creatives, plus Escape Studio's industry connections, helps open doors for those looking to work in the competitive creative industries.

Escape Studios is a leader in VFX training and education and its links with industry were clearly on display at its showcase event last month - The VFX Festival. One of the biggest events in the VFX calendar, the Festival is known throughout the industry as a celebration of the creative industries and a showcase of talent.

The *Star Wars* theme continued with a headline talk on Day Three from ILM's Scott Pritchard, who has put his VFX skills to films such as *Inception*, *Thor: The Dark World* and now *Star Wars: Episode VII – The Force Awakens*. Scott showcased the details that went into creating the character of Maz, demonstrating the volume of work that went into something so small, such as her eyes. The audience was impressed with the VFX detail in the castle scene – Scott gave his insight on the 40 or 50 different statues, how the team had to try and get the right one for the film and how every flag on the castle had a special meaning.

Star Wars not only racked up in the box office and BAFTAs, it was the clear show-stealer at the 2016 VFX Festival and brought in the biggest crowd. It was an amazing talk to wrap up three days of behind-the-scenes footage, careers advice, expert tips and tricks, VR fun and awesome insight into the creative industries!

Find out how you can be the next VFX award winner at pearsoncollegelondon.ac.uk/escapeawardwinners.

*Image courtesy of Carlos Conceição

*Image courtesy of Carlos Conceição

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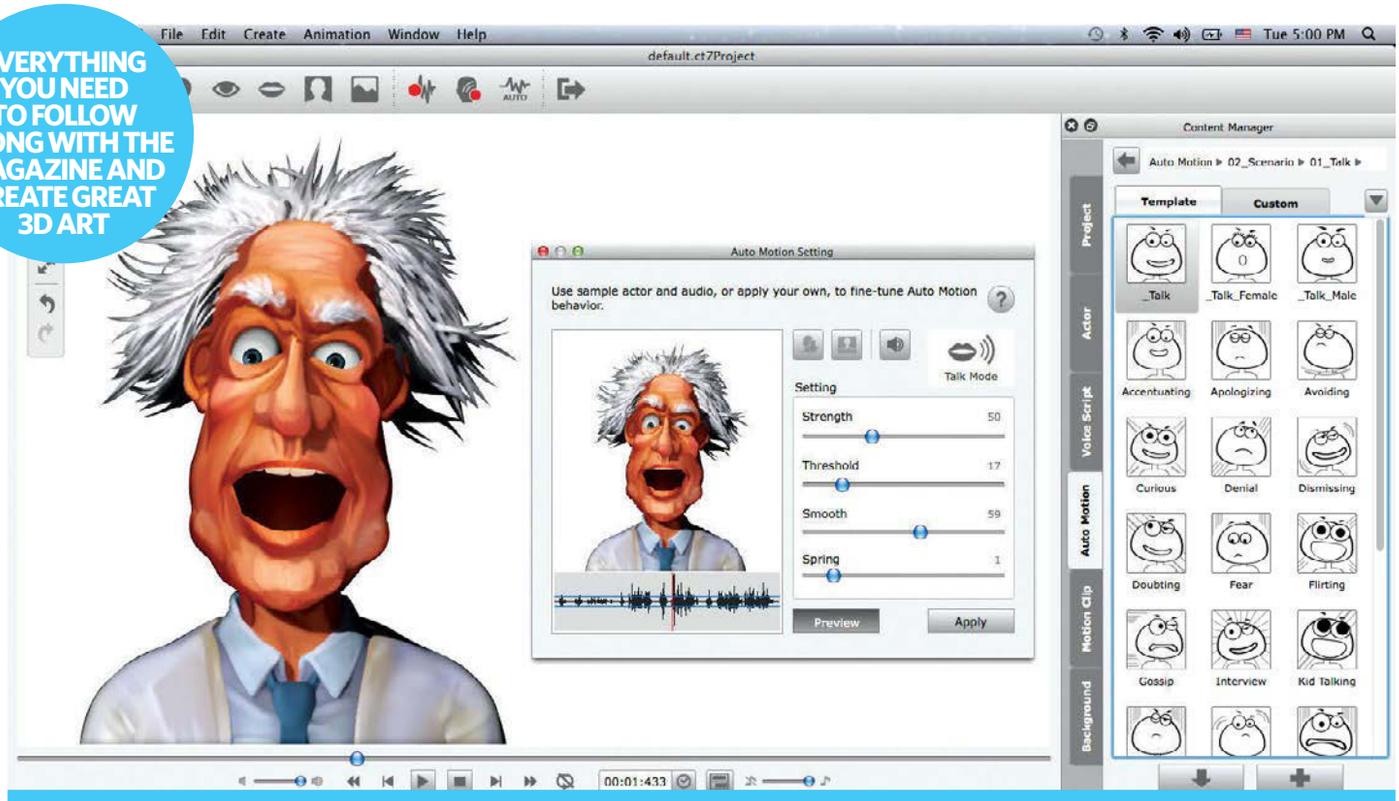

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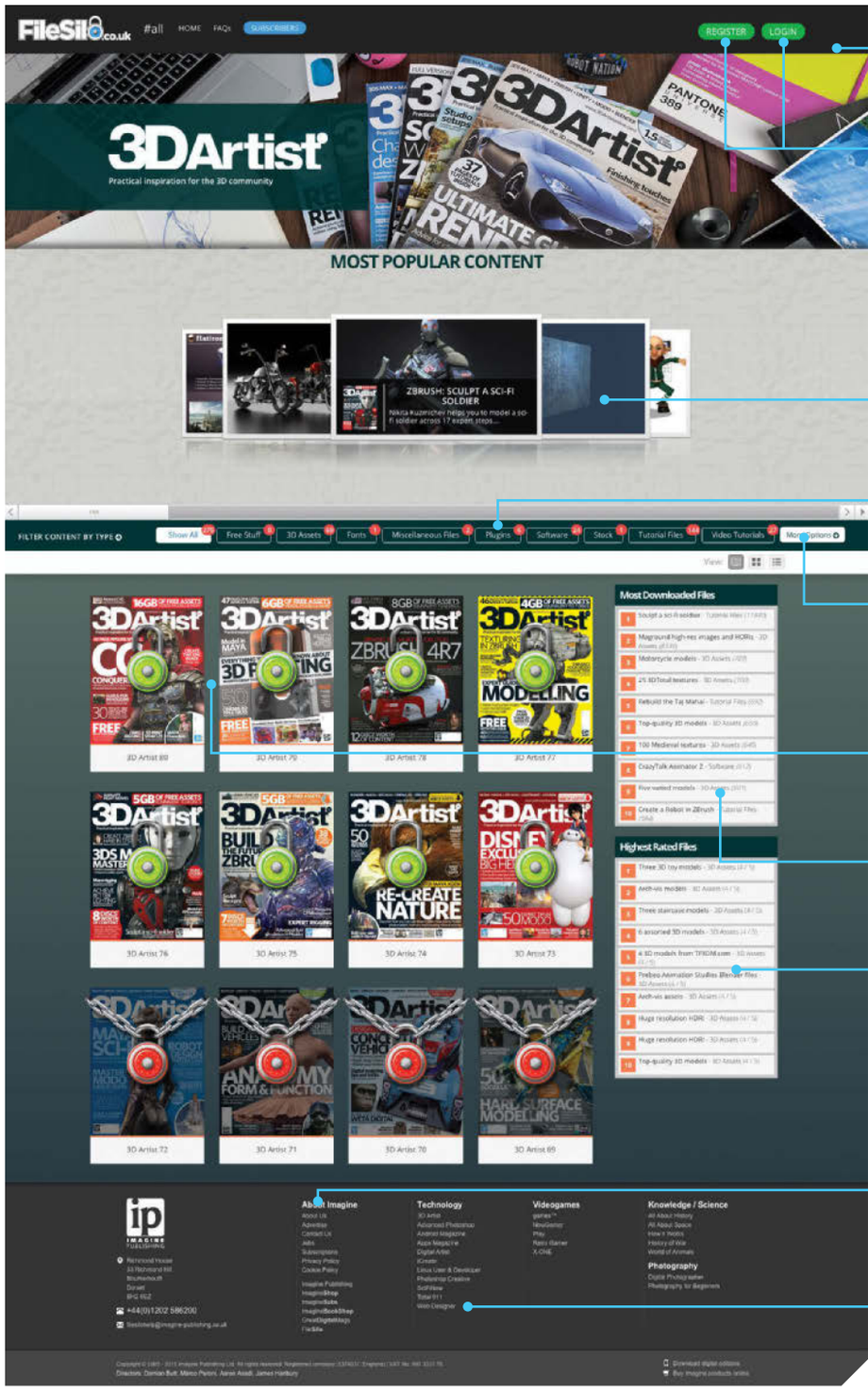

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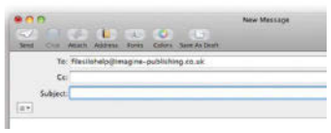

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